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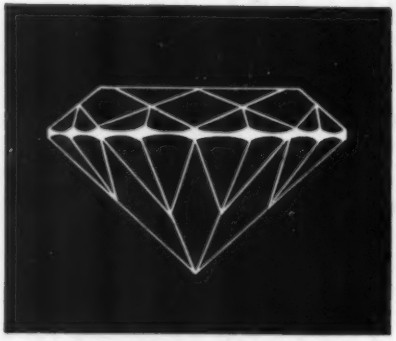

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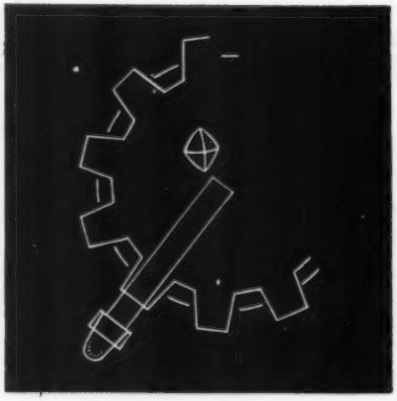

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INDUSTRIAL DIAMOND REVIEW

Vol 20 No 241
December 1960

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Generally Speaking

Seasonal Greetings

The staff of Industrial Diamond Review and Industrial Diamond Abstracts wish to all their readers a happy Christmas and New Year.

W. H. Wollaston

The article that follows is a facsimile reproduction of an original in The Royal Society Proceedings about a century and a half ago. The author, Dr W. H. Wollaston, was a most interesting character—almost, one might say, a universal genius. He started as a medical man, and it appears that he could have had a successful career in that profession, but he turned from it to chemistry, physics, and a number of other scientific studies, in which he achieved great eminence. Moreover, unlike many other scientists, he had the ability to profit financially from a number of his discoveries. Amongst his other profitable work was the discovery, or rather rediscovery, of the method of cleaving diamonds. This had been known in earlier days, but the secret had been lost. Working from first principals, Wollaston successfully cleaved diamonds, by the same methods that are still used today, and made practical use of his knowledge and skill, it is said, by buying badly spotted diamonds at low prices, cleaving them into smaller stones, and realizing a handsome profit by reselling at improved prices to the cutters.

His ability as an experimental scientist can to some extent be judged by the article published here. In the period that has passed since he did this work, a number of eminent men have made experiments into the factors relating to the glaziers stones but it is apparent that very little real advance has been made in this study, in spite of all the improvements in apparatus and the increase in general scientific knowledge.

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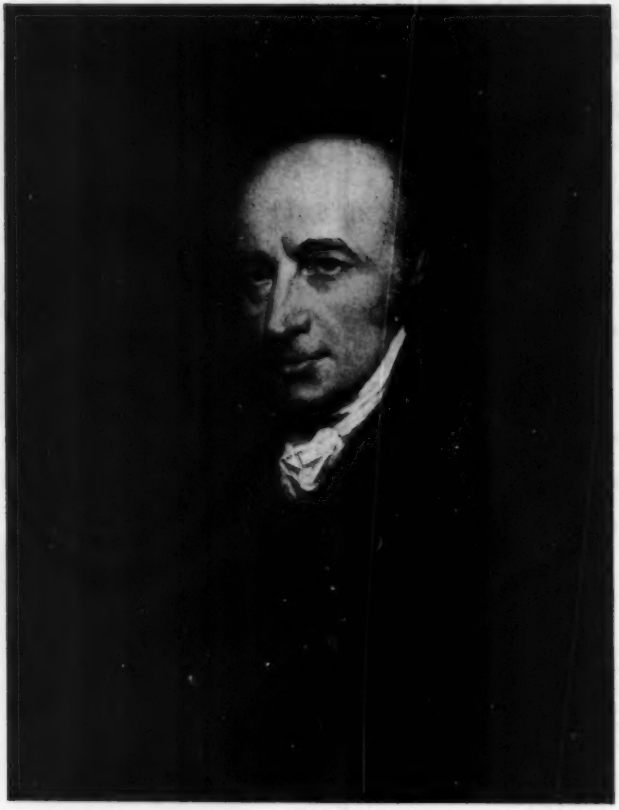

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WILLIAM HYDE WOLLASTON, M.D. F.R.S

W. H. Wollaston

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XIV. *On the cutting diamond.* *By* W. H. Wollaston, *M. D. Sec. R. S.*

Read May 2, 1816.

When we consider how long the diamond has been in common use for the purpose of cutting glass, it is rather surprising that no adequate explanation has been given of that remarkable property, and that even the conditions on which the effect depends have not been duly investigated.

Many persons, indeed, are not aware of the distinction that is to be drawn between scratching and cutting. In the former, the surface is irregularly torn into a rough furrow; in the latter a smooth fissure, or superficial crack, is made, which should be continued without interruption from one end to the other of the line in which the glass is intended to be cut. The skilful workman then applies a small force solely at one extremity of this line, and the crack which he forms is led by the fissure almost with certainty to the other.

Any other substance harder than glass, possesses the power of *scratching* in common with the diamond. But the power of *cutting* has been thought confined to the diamond; and it is true that its peculiar hardness certainly contributes to the duration of that power.

I was informed that persons employed in setting diamonds for the use of the glazier, always select natural diamonds distinctly crystallized, which they term sparks; but upon what

circumstance this supposed superiority of the natural diamond over that which has been cut by art, could depend, I was not able to gain any information.

Having procured a common glazier's diamond ready set, and such a quantity of glass as I thought would be sufficient for learning by experiment the art of cutting, I endeavoured first by forcible pressure on the point in different directions to effect my purpose. But although I could thus tear the surface to a considerable depth, I could by no means command the direction of the fracture.

When I placed the diamond more inclined to the surface, I could occasionally, and in part, obtain what I thought to be a proper cut; but I was unable to continue the stroke with steadiness, and so incapable of repeating it a second time with a similar effect, that I was convinced the precise direction necessary for cutting was confined within very narrow limits.

Having found that the diamond required to be moved in the direction of one of its edges, and having by repeated trials formed a judgment of the requisite inclination of its handle, I mounted it in a frame, in which I could fix it at any angle of elevation that appeared suitable, and could turn it round its axis to adjust the direction of its edge. By this arrangement I had no difficulty in repeating any successful trial, or of varying it according to hints derived from such imperfections as were observable; and I soon discovered that difference in the form of the natural diamond, from that of diamonds cut by art, on which I believe the power of cutting to depend.

When a diamond is formed and polished by the lapidary, all the surfaces are *plain* surfaces, as far as it is in his power to make them so, and consequently the edge or line in which

they meet is straight. But in the natural diamond there is this peculiarity in those modifications of its crystals that are chosen for this purpose, that the surfaces are in general all *curved*, and consequently the meeting of any two of them presents a curvilinear edge. If the diamond be so placed, that the line of the intended cut is a tangent to this edge near to its extremity, and if the two surfaces of the diamond laterally adjacent be equally inclined to the surface of the glass, then the conditions necessary for effecting the cut are complied with. The curvature, however, of the edge is not considerable, and consequently the limits of inclination are very confined; for if the handle be either too much or too little elevated, then one or other extremity of the curve will be made to bear angularly upon the glass, and will plough a ragged groove by pressure of its point. But on the contrary, when the contact is duly formed, a simple fissure is effected as if by lateral pressure of the adjacent surfaces of the diamond directed equally to each side. By that means, adjacent portions at the surface of the glass are forced asunder farther than the mere elasticity of the parts beneath will allow, and a partial separation or superficial crack is produced.

The effects of inequality in the lateral inclination of the faces of the diamond to the surface of the glass, are different according to the degree of inequality. If the difference be very small the cut may still be clean; but as the fissure is then not at right angles to the surface, the subsequent fracture is found inclined accordingly. But when an attempt is made to cut with an inclination that deviates still more from the perpendicular, the glass is found superficially flawed out

on that side to which the greater pressure was directed, and the cut completely fails.

It might be thought that the weakness of the glass in this part would nevertheless occasion it to break in the desired direction; but the bottom of a flaw is in fact of very great breadth when compared to the simple crack produced in a proper cut. In one case the force applied to break the glass is dispersed over a space of some extent, and may be diverted from its course; in the other the whole force is confined successively to the mere points of a mathematical line, which may be conceived the bottom of the fissure, and is directed onward by the facility with which the adhesion of each particle in succession yields to its progress.

The depth to which the fissure made by the diamond penetrates, need not be greater than $\frac{1}{200}$ of an inch, for I found that the fracture might be completely turned from its course, at any part of the intended line, by grinding away a portion of the surface; and by an average of several experiments the thickness of the glass was not found to be diminished so much as $\frac{6}{1000}$ths of an inch.

Since the form of the cutting edge appeared from the above trials to be the principal circumstance on which the property of cutting depends, I thought it not improbable that other stones possessed of the requisite hardness, might be found to produce the same effect, if brought to a similar curvilinear edge. By a little pains I succeeded in giving this form to a sapphire, a ruby, a spinell ruby, to rock crystal, and some other substances, and found that each of these bodies has the power of cutting glass for a short time with

a clean fissure. But notwithstanding the hardness of the ruby was such as to occasion a great deal of labour in giving it the form I wished, the edge of this stone was by no means proportionally lasting. I am inclined to ascribe this defect in part to the grain or position of its laminæ having been unluckily oblique. And it seems highly probable that the singular durability of the edge of the cutting diamond, is owing in some measure to this circumstance, that its hardness in the direction of the natural angle of its crystal, is greater than in any other direction, as we find to be the case in other crystals of which the various degrees of hardness in different directions can be more easily examined.

Two contemporary examples of glass cut with diamond tools by E. M. Dinkel of the Edinburgh College of Art.

Coolants for carbide-tool grinding... they do make sense

by

*David C. Kauffman**

According to several leading diamond wheel manufacturers, coolants can reduce wheel consumption by two thirds. They also can improve work finish and increase stock removal rates. If there are production and economic advantages, what are the disadvantages that seem to be so powerful?

Admittedly there are a number of real problems and some of them are human not technical. But they can all be overcome if the shop can pick a good coolant for its particular job, then learn how to apply the coolant properly.

Management is often aware that coolants for tool grinding can make a real difference in results. Foremen and lower management often ignore this area of cost reduction because they know that coolants may become a labour problem. Coolants are plainly not convenient nor desirable from the point of view of the operator.

Odour

Grinding oil odour is the most common objection, strictly a human reaction because odour obviously has no effect on the work produced. The odour saturates the area around the machine and it gets into the operator's hair and clothing. It makes a mess that cannot be avoided (with coolant applied in a conventional way) if the operator must constantly check his work at the machine. But there are odourless grinding oils on the market; you just have to look for them. Check for odour by rubbing some between your hands to warm it, then hold your hands close to your face. You should detect no odour and your eyes should not smart.

Smoking

When there is too much pressure between the wheel and the work, there will be friction and heat, which makes conventional cutting oils smoke. This can be minimized by several methods. One is to choose an oil that will not smoke, providing it also does a cooling job. Another is to apply coolant in sufficient quantity to remove heat from the grinding area, which will prevent heat buildup. Third, use grinding procedures that will not develop heat or excessive feed or depth of cut, both of which raise the wheel pressure.

Smoke is an indicator of excessive heat which may damage the wheel and should always be avoided. Any diamond wheel has a practical limit to the depth of cut or feed rate it can handle, mainly determined by the grit size of the diamond particles. If you go over these limits, you are bound to produce heat and smoke.

It may be true that dry grinding produces no smoke, but dry grinding means hot grinding that can ruin the wheel and produce a cloud of diamond dust that wastes away a costly wheel. The best way to keep diamond costs down is to keep the diamonds in the wheel where they can work for you. Therefore, heat should be avoided.

Economy

The most important technical factor is cost. Will the coolant cost more than it can save in increased production and lower wheel wear? Some exotic cutting oils that do a good job are much too expensive. A diamond wheel that works seven hours a day with coolant applied by felt wick will need two to three quarts of coolant a day. You can't starve a grinding wheel for coolant just to save coolant cost, because this will prevent the coolant from doing its necessary job. For average savings in time and cost it is reasonable to spend from $4 to $4.50 per gallon for coolant.

Heat absorption

The cooling ability of the oil should be checked if possible. Water base emulsions have high cooling capacity because of the high proportion of water included. Most oils have lower heat absorption rates, but there is a remarkable difference in cooling ability among cutting oils.

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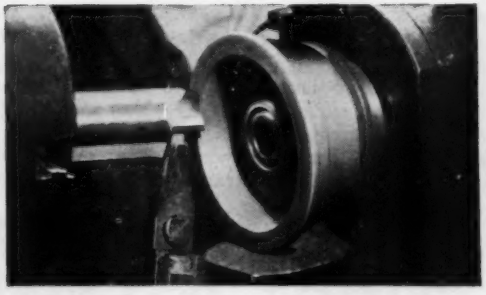

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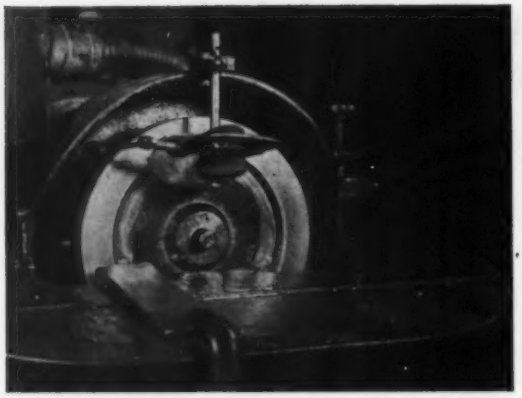

Fig 1. A wick feed on an offhand grinder is simplicity itself. A removable rod forms a bracket to which the felt wick is clamped. The wick touches the wheel in a position to feed coolant to the tool contact point on the wheel.

Oil versus water

Undiluted oil naturally costs more than a 30 : 1 or 60 : 1 water base emulsion, but the results with an oil are often measurably better. Cooling action with a water base liquid may be too good—the water has a tendency to quench hot carbide which may damage the wheel bond and produce cracks in the carbide.

Water will not lubricate the space between the diamond wheel and the carbide. In addition, a water base coolant may tend to gum up and clog up the wick applicator. You can see the difference during a grinding cycle, where an oil tends to keep the wheel cleaner and freer cutting because it penetrates and cleans the face of the wheel.

In years of grinding and testing carbide we have never been able to get a scientific explanation of the fact, but we find that tool edges ground with an oil coolant are measurably better than those done with a water base coolant. Examination under a 20X scope shows greater sharpness and smoothness. Finish on the carbide is finer.

Perhaps it is partly due to the detergent action of grinding oil, which makes the oil wet better, take on heat better, and cushion the shock of the wheel on the cutting edge.

Clean wheels

It is most important to keep the wheel clean while it is working. The wheel cuts faster, the diamonds are exposed better, pressure is lower, heat buildup is lower, the work sparks out faster, sizes are easier to hold, and finish is improved.

It is something of a novelty for an experienced machinist to see how clean a wheel can be when grinding carbide if oil is applied. Usually the wheel is covered with sludge, even if air mist is applied.

If a tool is covered with sludge after being ground, it may be hard to clean and examine. But if the grinding oil is soluble in water, the tool can be swished around in water for a few seconds to remove all traces of oil and sludge. A water soluble oil is also easier on clothing and fixtures as it can be removed with water.

Fire hazard

A good way to check for flash point in the cutting oil is to put some in a jar lid, light a match, then place the match in the oil with the unburned end resting on the edge of the lid. If the entire match will burn without igniting the oil, the flash point is probably high enough for safety.

Viscosity

A good coolant has low viscosity for two reasons. First, it improves wetting action, which means better cooling. Second, it improves capillary action as the oil feeds through the wick applicator. But a coolant should not have excessive volatile solvents because they will evaporate and leave gummy residue on the wheel and wick.

Acidity

pH for the coolant should be as close to 7 as possible—neither acid nor alkaline. A resinoid wheel bond will be affected by either acidity or alkalinity and you might lose diamond grit too rapidly.

Rustproofing

It is also desirable to have rustproofing qualities in the oil. This can be checked by

Fig 2. A carbide tool is diamond ground. (Note the converted milling machine base). The wick feeds coolant to the surface of the diamond wheel and the line feeds oil from the reservoir above.

dipping test pieces of steel in two or more coolants and running exposure tests. The samples should be liquid honed or smoothed with dry emery paper before dipping and testing.

Application method

From the above qualifications you can see that it is important to apply the coolant the right way; there are so many elements that can go wrong and ruin your results.

For 90% of all carbide tool grinding, wick application of coolant is the most effective and practical method. Most toolroom and cutter grinders are not designed for flood cooling; in fact most are designed for dry grinding. Unless the coolant is applied effectively it is a complete waste of time and effort.

Air mist is not usually effective for several reasons. It is usually expensive and wasteful; it often pollutes the atmosphere around the machine, and it usually requires a water base coolant, which will not clean the wheel as will oil. Among other disadvantages it provides too little coolant.

Oil wick cooling can be applied to all kinds of tool grinders, offhand, cutter, surface, and OD. Each type of machine can easily be adapted for wick coolant application at low cost and with minimum trouble.

There are two ways to meter oil to the wick.

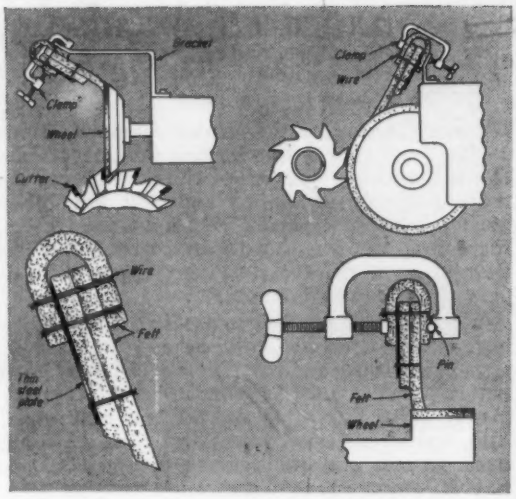

Fig 3. A felt wick can be clamped to any kind of holder. The notches are to prevent slip and the spring steel plate to provide stiffness. The wire is to hold the assembly together.

One is to saturate the wick from an oil drip cup, and another is to install a bulky felt wick and add coolant as required from a squeeze bottle. A saturated wick can hold enough coolant for

Concluded on page 238

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*Shaped Diamonds for Portable Form Truing**

by **F. O. Hoagland****

Cutting action of the shaped diamond leaves a clean, open, and free cutting surface on the formed wheels. The wheel dimensions can be more precisely developed and will last for a greater number of passes. These are the reasons for using precision shaped diamonds for wheel forming with the Pratt-Whitney Diaform portable wheel forming instrument.

Three diamond tools are used by the Diaform in forming the face of an abrasive wheel, rough, semi-finish, and finish. The rough tool is of natural shape and unground, with approximately 0.020 in. radius and 60° included angle. The semi-finish and finish diamond tools are both ground and polished to either 0.005 in. or 0.010 in. radius as required.

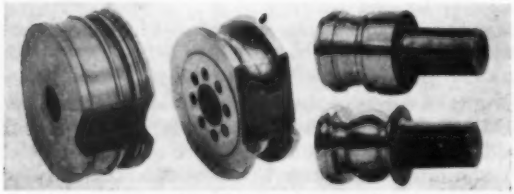
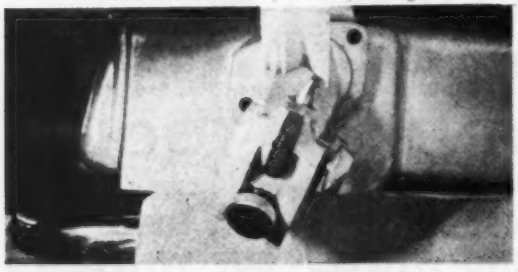


Fig 1 Above are examples of the complex forms which can be developed by form grinding. All the forms are the result of wheel-forming with single point diamond tools.

Fig 2 Below, new portable wheel-forming instruments and improved diamond tools, as illustrated here, have greatly enhanced the art of wheel forming.



The roughing diamond tool is used, only for the first 'rough' forming of the wheel. A 0.010 in. radius diamond is then used and followed by either another 0.010 in. radius diamond or a 0.005 in. diamond depending upon the sharpness of the corners. Corners of 0.015 in. radii or less require the 0.005 in. radius diamond for final forming.

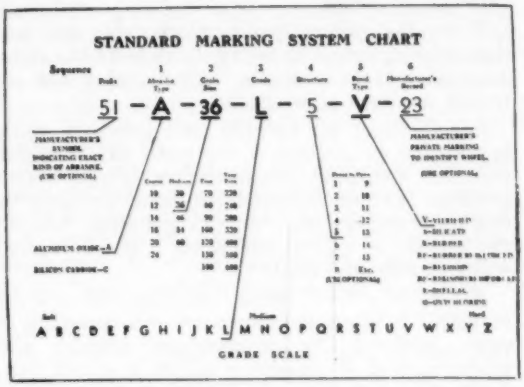


Fig 3. The 'Standard Marking System Chart' shows the standard markings for wheels of aluminum oxide and medium grade which are recommended for form grinding.

When properly used, the diamonds will hold their precise shape for considerable time. For work with the most rigid surface specifications, the diamonds must be occasionally re-polished by a diamond cutter.

The blocks that hold the diamond tools when they are in contact with the abrasive wheel are bored at an angle of 5 degrees. This provides relief behind the actual cutting edge of the chisel-shaped diamond. The angle of the diamond shank must lean with the wheel rotation, not against wheel rotation.

In the majority of cases, it is possible to do the bulk of the wheel truing with the flanks of the outer edges of the truing diamond, and by so doing maintain the true curvature. If, after considerable use, the cutting edge of the finish truing diamond shows signs of wear, it can be reversed by turning it 180 degrees in its block. When the radii of both cutting edges of the finish diamond are worn to an untrue shape, the diamond can be used for semi-finish forming.

The most important precaution with regard to diamond life is to prevent overheating of the diamond tips. The harder the wheel the greater the danger of overheating. A copious and steady supply of regular work coolant should be maintained during wheel forming. Wheel speed should be reduced by about 50 per cent on wheels of hard grade when truing. For forming the hardest grade wheels, smaller cuts—0.002 to 0.003 in. pass—should be taken from the wheel.

---

* Reprinted with permission from '*Grinding & Finishing*' 1960 Vol 6 (4) pp 37-38 (Apr).

** Pratt & Whitney Co.

Forming the wheel is fast and simple

The time required to form a wheel depends on the diameter of the wheel, the width and depth of the form to be produced, the bond and grit in the wheel, the finish required on the machined pieces, and to some extent, the skill of the operator. An experienced operator usually takes from 15 to 30 minutes to form a new one-inch wide, ten-inch diameter wheel.

Almost any form can be produced on the grinding wheels, but the greatest latitude should be sought on internal corners, as the sharper the corner required, the longer the job will take.

A profile drawing of the piece to be ground is transferred to a template. The template form is made exactly five or, in some cases, exactly ten times larger and just the reverse of the form required on the finished piece. The template is secured to the mounting plate of the Diaform. The diamond tools are lined up by means of a gauge so that they will contact the blank wheel directly on a centre line of the wheel spindle.

The desired form is then trued into the wheel face by successive passes of the tracer over the template edge. The operator's movement of the tracer guides the diamond tool as it cut-forms the wheel. Tangential guards prevent the grinding wheel from cutting the diamond mounting. These guards also prevent the diamond from overcutting the wheel.

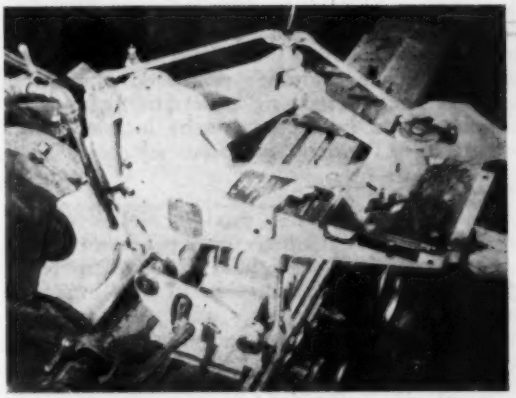
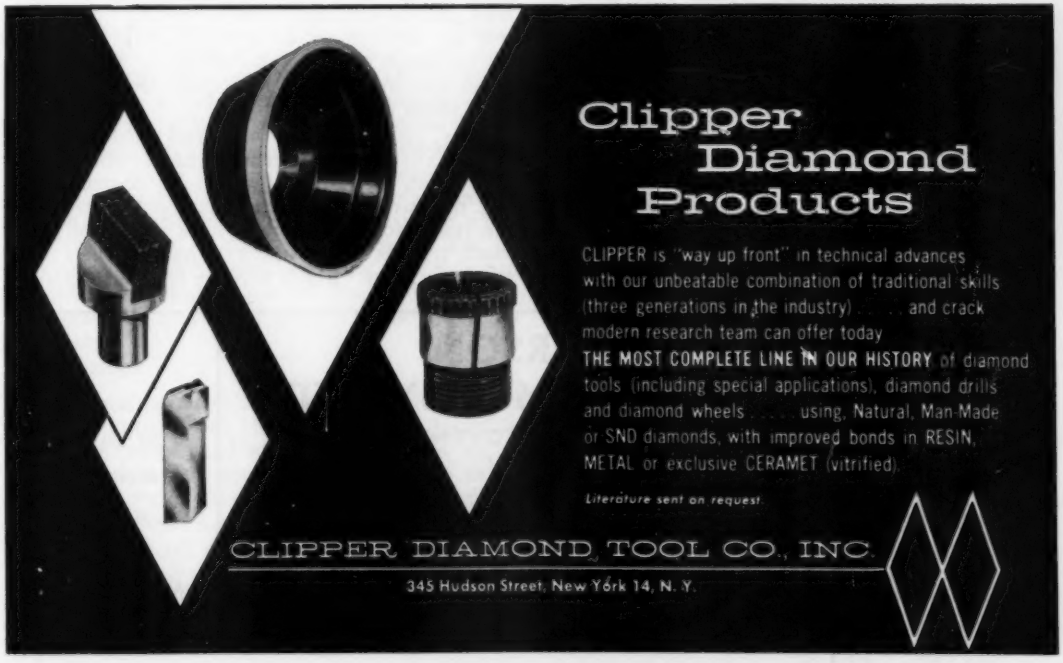


Fig 4. In operation here is the Diaform wheel-forming portable attachment which transmits the dimensions of a wheel profile template to the wheel, through the pantograph linkage. Three diamonds are used to rough, semi-finish, and finish the form in the wheel.

The cross feed of the diamond forming tool during true forming of a grinding wheel must be regulated according to the diameter of the wheel and the surface finish requirements.

If the surface requirements of the machined piece are extremely rigid, then the diamond tool must be moved across the wheel at no more than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$\frac{1}{4}$ or $\frac{1}{8}$ the width of the diamond point for each revolution of the wheel. Faster crossfeed leaves imprints of the tool point on the face of the wheel. Where surface specifications for the finished piece are less rigid, the final forming of the wheel can be accelerated by increasing the cross feed of the diamond tool.

Wheel sizes and types formed

An intermediate size model handles wheels up to 14 in. in diameter and produces forms up to two inches wide with a maximum form depth of one inch. It has a 5 to 1 pantograph ratio.

The largest wheel-forming model can be used for wheels up to 20 in. diameter. Maximum width of form is three inches and maximum depth of one inch. It has a 5 to 1 pantograph ratio.

The choice of correct grinding wheel is very important. Because of the ease with which wheel retruing is performed, the harder and coarser wheels should be avoided for better finish on the work and longer life for the truing diamonds.

For form grinding of high-speed steels or hardened tool steels, aluminium oxide wheels have been found best suited. A grit size of 100 is the most satisfactory for all forms encountered, but a finer grade may sometimes be found preferable for small, clearly-defined forms. Vitrified bonds are generally preferred over silicate bonds. In the form grinding of steels, a wheel of aluminium-oxide, 100 grit, grade G or H will prove satisfactory for most jobs. Forms with internal corners of a minimum of 0.008 in. radius can be readily ground using a finer and harder wheel such as one with 150 grit, grade I.

When any wheel is formed, it should be carefully balanced and mounted on the grinder and trued on all faces in the normal way before attempting to use the forming instrument.

Concluded from page 235

4-5 minutes of grinding, so this method isn't so tedious as it sounds.

The wick can be mounted on an offhand grinder by bolting a piece of strap iron to the grinder guard or hood, then clamping the wick to the strap so it touches the wheel. This arrangement should be demountable so the wick can be swung aside when the tools are not being ground.

If the offhand grinder has a water pump, there is usually a small copper tube leading down from the tank to the centre of the wheel. A piece of felt can be wired or clamped to the end of the tube, then the water soluble compound in the tank replaced by oil. Finally, move the support so the wick touches the inner edge of the grinding wheel so oil will flow uniformly to the actual spot on the wheel where the tool is being ground.

Wickholders can be improvised in similar ways for surface and OD grinders. If the wick must be curved to reach an oddly located wheel, you can wrap the outside of the wick with $\frac{1}{16}$ in. iron wire, then bend the wick into place.

Most wheel wear in form grinding takes place when the tools are being roughed. The wick and coolant may seem to hinder operations, but the advantages in reduced wheel wear will far outweigh this minor difficulty. Before final grind, the tool should be wiped clean or rinsed, then finish ground dry.

It is often difficult and awkward to grind milling cutters on a cutter grinder, and a wick may seem like just one more complication. But the savings in costly diamond wheel wear can really add up, and the wick isn't really that much trouble if the operator has an open mind about coolants. Tools such as reamers, counter-

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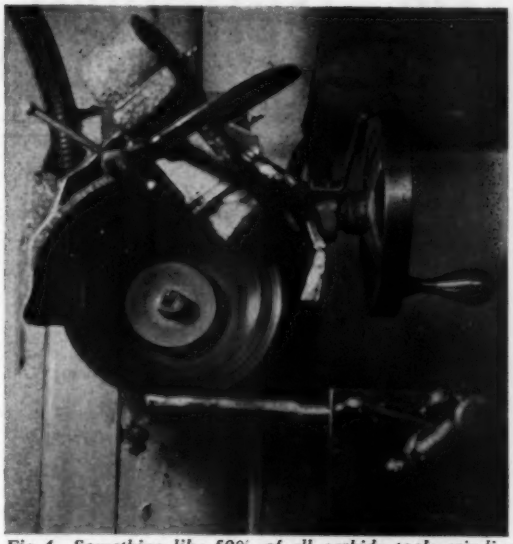

Fig 4. Something like 50% of all carbide tools grinding with coolant is done on set-ups similar to this one.

bores, end mills, flat form tools, and so on, can all be ground with coolant from a wick. All will end up with sharper edges, longer life between grinds, and therefore less frequent grinding.

Equipment

Wicks should be hard, stiff about $\frac{3}{8}$ in. thick made from flat sheet or round lengths. Round felt is usually fitted to an OD wheel, and may be wire wrapped for extra stiffness. The felt must always be in contact with the diamond wheel and always under light pressure against the wheel.

Wicks should also be attached in such a way that the operator can easily move them aside in order to see the work without getting sprayed, and to move the wheel from the machine without interference. Often a wheel guard will be necessary to avoid excess spraying, but this can be made from sheet aluminium, bolted or clamped into place so it can be quickly removed when necessary.

Results

In our shop we have adopted an oil (not standard cutting oil) that has all the desirable properties mentioned above. We know for a fact that some of our wheels are giving us at least 200% more life than when dry. The tools are being ground sharper and to a finer finish.

Here's a specific example: On one edge grinding operation in our shop (on rougher bits), a $3\frac{3}{4}$ in. 60° cup wheel has ground over 15,000 tools, removing at least 0.004 in. of carbide in passes of approximately 0.0008 in./pass. The resinoid wheel has a 320 grit diamond cutting section $\frac{3}{8}$ x $\frac{1}{16}$ inch. Tool edges come out at 2-3 micro-in. and are razor sharp. We couldn't possibly achieve this grinding life or finish with any coolant other than an oil with the properties described. A number of wheel manufacturers have tried the same set-ups and verified our results.

De Beers Announces Production of Synthetic Diamond on Commercial Basis.

"De Beers Consolidated Mines, Limited, announces that it has arranged for the production in South Africa of synthetic diamond grit on a commercial scale. At the present time there are ample stocks of natural diamond grit for the world market. In view, however, of the interruption of diamond mining operations in the Congo, the production of synthetic material is being undertaken as a precaution to ensure that there will be no break in supplies to the market." At the press conference where Mr Oppenheimer made the announcement, he repeated his opinion that, for most applications, natural diamond is superior to synthetic.

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INDUSTRIAL DIAMOND ABSTRACTS

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1960 Volume 17
DECEMBER

DIAMOND MINING AND INDUSTRY

Africa's key role in diamond mining. Pt I

A. F. Daily. *World Min* 1960 Vol 13 (10) pp 38-43 (Sep)

The author recently made an extensive tour of the principal African diamond mines and here surveys the general situation with regard to sales and traces briefly the histories of various companies. The commanding position of De Beers at all stages of diamond production is stressed. 11 illustr, 1 table.

D *F.25.36*

Africa invites you to attend The 7th Commonwealth Congress

Anon. *World Min* 1960 Vol 13 (10) pp 46-47 (Sep)

Among the technical papers to be given in Johannesburg is 'The diamond industry' by Mr. H. F. Oppenheimer, chairman, De Beers Consolidated Mines, Limited. Other important papers include: 'Industrial diamond research' by R. G. Weavind and Dr. J. F. H. Custers, joint directors, Diamond Research Laboratory; 'Diamond recovery in Southern Africa' by R. J. Adamson, consulting metallurgist, Anglo-American Corporation of South Africa, Ltd; and 'Diamond mining in Southern Africa' by G. S. Giles, consulting engineer (diamonds), Anglo-American Corporation of South Africa Limited. *D* *F.25.361*

European Common Market

Anon. *Diamant* 1960 Vol 4 (23) p 15 (July) (In English)

Describes the effects on the diamond market of the European Economic Community. It is concluded that import duties will scarcely influence the diamond industry. *D* *F.251.32*

Diamond financing [:] Dutch venture in Antwerp

Anon. *Financial Times* 1960 (22163) p 9 (Aug 17)

The Nederlandsche Handel Mij (Nertherlands Trading Society) of Amsterdam, one of Holland's big five banks, has established a subsidiary under Belgian law in Antwerp, the Internationale Handels En Diamantbank (International Trade and Diamond Bank). The bank will provide general banking services while specializing in diamond financing. There are already two other banks in Antwerp specializing in diamond financing.

D *F.251.324*

Diamond talks in London [:] Israel seeks bigger allocation

Anon. *Financial Times* 1960 (22198) p 17 (Sep 27)

Talks between the Director General of the Israel Ministry of Trade and Industry and members of the Central Selling Organisation are reported to have had as their main aim an increased allocation of rough stones to the Israeli diamond cutting industry. In the first half of 1960, the Central Selling Organisation supplied only 10% of Israel's total imports of 650,000 ct of uncut stones. This was an advance of 36% on Jan-June 1959, but is considered too low a proportion of total imports, since second or 'third' hand purchases of rough stones from other sources appreciably raise the cost of the raw material to local industry.

D *F.25.351*

Diamond winning in Russia. Les exploitations diamants en Russie

Anon. *Bull van het Verbond der Belgische Diamantberoepsverenigingen* 1960 (3) pp 2-3 (Aug-Sep) (In French & Flemish)

A *F Hd.33*

Siberian platform — diamonds

V. E. Dibrov *et al. Library of Congress Mthly Index Russ Access* 1960 Vol 13 (4) p 1442 (July) (Original in Russian)

Book, Izd-vo Akad nauk SSSR, Moscow. 1960, 96 pp. [Not in library of Industrial Diamond Information Bureau]. *D* *F.33*

Mineral discoveries in India

Anon. *Min J* 1960 Vol 255 (6530) p 413 (Oct 14)

A pipe containing diamonds of a rare variety has been discovered in the Majhagawan diamond mines in the Panna district. According to an official announcement, the pipe was discovered during an official survey and exploration of the area conducted by the Geological Survey of India. *D* *Ebc.12.371*

Little known rich diamond mine in the Free State

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (5) p 4 (July)

Refers to the Star Diamond Mine, Orange Free State, where the diamonds are said to be the best average quality gems found in South Africa.

D *Ebb.361*

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Tanganyika's search for minerals

Anon. *Min J* 1960 Vol 255 (6532) p 468 (Oct 28)

The annual report of the Geological Survey Department of Tanganyika for 1959 states that there are good hopes of finding fresh mineral deposits within the country, including a possibility of new diamond deposits, both as kimberlite bodies and as alluvial deposits. *D* *Ebb.12.364/Ebe.12.364*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF DIAMOND

Diamond physics

F. C. Champion. *Nature, Lond* 1960 Vol 188 (4748) pp 368-369 (Oct 29)

Summarizes papers given at a conference on diamond physics held in Sep, 1960, under the auspices of the Institute of Physics and the Physical Society. Most of the twenty-one contributions were experimental; two theoretical papers on related topics were those by P. Ewald on the electron density of diamond and H. Clark on the nature of bond orbitals.

There were two papers on synthetic diamonds: one by E. Lundblad on their production and the other by S. Tolansky on optical and interferometric studies on surface characteristics of diamond compared with synthetic diamonds from several sources. Several contributions dealt with semi-conductive diamonds and with the study of graphitization. Experiments on irradiation damage to diamonds by electrons of energies up to 2 MeV were described.

Four papers illustrated the growing importance of silicon carbide.

See also *Industr Diam Abstr* 1960 Vol 17 p A273 (Nov). *D* *F Vwg.231/Fh Ha.231*

Super-cell structure of semiconductors

B. R. Pamplin (Nottingham Univ). *Nature, Lond* 1960 Vol 188 (4745) pp 136-137 (Oct 8)

Structures of many compounds and alloys have been shown to be essentially super-lattices on a few lattices. Interest in the diamond structure in particular has been stimulated recently by the technological importance of semi-conductors, the best known of which, germanium and silicon, have this structure. Some work has been done in an attempt to list the possible super-lattices of the cubic lattices, but the diamond structure has not yet been considered. This communication introduces a new approach to the problem of super-lattices. 7 ref, 2 tables. *D* *Bde Ubb.21/Bdf Ubb.21*

The diamond and its problems

R. Webster. *Goldsm J* 1960 Vol 66 (501) pp 492-493 (Nov); *Gemmologist* 1960 Vol 29 (352) pp 216-220 (Nov)

Problems connected with the identification of diamond are discussed. *D* *F Hkb.1313*

Artificial colouration of diamond

F. A. Raal. *Diamant* 1960 Vol 4 (24) pp 5-10 (Sep) (In English, Flemish and French)

Emphasis is on diamond colours obtained artificially and how diamonds coloured in this way can be distinguished from those having natural colours. 3 illustr, 8 ref. *D* *F Hx Ukb*

Testing for electro-conductivity

R. Webster. *Gemmologist* 1960 Vol 29 (350) pp 161-169 (Sep)

The incentive to explore the electro-conductivity of gemstones was the method of colouring gem diamonds to a pale blue by bombardment with electrons, or gamma rays, using a Van de Graaf generator or other suitable particle accelerator. Dr. J. F. H. Custers first pointed out that all natural blue diamonds are of type IIb, distinguished by the fact that they are electro-conducting, whereas the diamond coloured by irradiation is usually the more normal type I stone, and not electro-conductive. Thus, electro-conductive blue diamonds may fairly well be assumed to have a natural colouration. Prof. R. W. Ditchfield designed an apparatus for distinguishing between natural blue and irradiated diamonds, while Benson and Crowningshield of the Gemological Institute of America were the first to follow Dr. Custers' lead by constructing an apparatus to detect electro-conductivity in diamond. More recently, details have been published by the Diamond Research Laboratory, Johannesburg, of an instrument in which the voltmeter of the American apparatus is replaced by a suitable telephone earpiece and may be worked on a dry battery of about 30 volts. The author has himself experimented on the electro-conductivity of gemstones using various types of hook-up, and this article records the types of detector experimented with and the results achieved with diamond and other gem materials. 6 illustr, 10 ref.
D *F Hx Uec*F Uec/F Uec Vfd W*

A simple method of differentiating between natural blue diamonds and diamonds coloured blue artificially

J. F. H. Custers, H. B. Dyer, F. A. Raal. *Industr Diam Rev* 1960 Vol 20 (236) pp 134-135 (July)

An adaptation of a method by Dr. J. F. H. Custers and H. B. Dyer provides a simple, quick and cheap way of ascertaining unambigously whether a diamond is coloured blue naturally or artificially. An additional advantage is that a brilliant does not have to be demounted, but could be tested *in situ* in a ring. The basis of the method and the procedure of testing are outlined. A considerable number of natural blue and other diamonds have been tested in this way and discrimination was always possible between them. 2 illustr, 2 ref.
D *F Gba*F Hx/F Ukb.1341*

Identifying precious stones (XXI). Wir bestimmen Edelsteine (XXI)

Anon. *Gold u Silber* 1960 Vol 13 (10) pp 49-50 (Oct) (In German)

If the stone is green, green-yellow, or green-blue, and shows simple or anomalous double refraction, it could be diamond; if it shows double refraction it is likely to be diamond. Opaque and almost opaque stones will not be diamond. Tables are given. 4 tables.
A *Bb Ccb/F Hkb*

Natural and synthetic diamonds

J. Milledge. *Times Sci Rev* 1960 (35) pp 10-12 (Spring) 10 illustr. *D* *F*Fh*

Crystallization. Kristallisieren

G. Nitschmann. *Z Ver Dtsch Ing* 1960 Vol 102 (28) pp 1343-1347 (Oct 1) (In German)

Various aspects of crystals and crystallization are discussed. The production of synthetic diamond is considered, the countries concerned are mentioned, and the methods used are explained. 51 ref.
A *Fh Ha*

BP 830,743 **General Electric Co**
(Feb 14, 1955—conv date, USA)
Method of making diamonds

It has been found that the common types of carbon, *ie* coal, coke, charcoal, graphite, can be transformed into diamond by subjecting the carbon to a pressure of at least 75,000 atm, preferably 80,000 to 100,000 atm, and specifically about 95,000 atm, at a temperature from 1,200 to 2,000° C, preferably 1,400 to 1,800° C, in the presence of (*i*) a metal of group VIII of the periodic table other than platinum; or (*ii*) chromium, tantalum, or manganese; or (*iii*) compounds of these metals which decompose to a metallic state under the conditions of the reaction. The process may be carried out in a high pressure device as described in BP 830,210 for insertion between the platens of an hydraulic press, *ie* an annular member with two conical punches fitting into cylindrical portion of the annulus which represents the reaction area to be heated, *eg* by electrical induction heating. The reaction vessel may be constructed of one of the metals acting as catalysts. (15 claims).
J *Fh Ha.1456.545*

PHYSICAL, CHEMICAL, & MECHANICAL PROPERTIES OF HARD MATERIALS

Properties of graphite Pt I — Preparation, structure and mechanical properties

L. C. F. Blackman. *Research, Lond* 1960 Vol 13 (10) pp 390-397 (Oct)

Some of the important aspects of the subject are discussed. Special attention is paid to the influence of structural and chemical imperfections on the various properties of graphite. Diamond and graphite represent the extreme structures in which carbon can exist as a solid and the variations in the two materials are considered. 5 illustr, 58 ref.
D *Bhb*F/Bhb U*

Variation with temperature of Young's modulus of polycrystalline graphite

I. B. Mason, R. N. Knibbs (Atomic Energy Research Establishment). *Nature, Lond* 1960 Vol 188 (4744) pp 33-35 (Oct 1)

2 illustr, 6 ref. *D* *Bhb Uncb Vb*

An electron microscope study of graphite oxidation

J. A. Hedley (C. A. Parsons & Co Ltd). *Nature, Lond* 1960 Vol 188 (4744) pp 44-45 (Oct 1)

3 illustr, 1 ref. *D* *Bhb Vw Wcmm*

Small angle X-ray scattering by pile-irradiated graphite

W. T. Eeles (Berkeley Nuclear Labs). *Nature, Lond* 1960 Vol 188 (4747) pp 287-289 (Oct 22)

2 illustr, 1 table, 6 ref.
D *Bhb Qv Uklb*

Dislocations in crystals

N. F. Mott. *New Scientist* 1960 Vol 8 (203) pp 914-915 (Oct 6)

Dislocations explain why single crystals of metals are so soft: if their movements can be arrested the metal is made much stronger. Investigation of dislocations has made very rapid progress through the discovery of a way of filming them in motion. 4 illustr.
D *Bd Unk.21*

Small-angle scattering of X-rays from deformed natural graphite

E. Matuyama (Yamaguchi Univ). *Nature, Lond* 1960 Vol 188 (4746) pp 218-219 (Oct 15)

1 illustr, 7 ref. *D* *Bhb Unklb*

A method of growing dislocation-free germanium crystals

B. Okkerse. *Philips tech Rev* 1959/1960 Vol 21 (11) pp 340-345 (Sep)

8 illustr, 8 ref. *D* *Bfr Vhf.1456*

Energy spectrum of holes in diamond-type crystals

K. Ya. Shtivel'man. *Sov Phys, Solid State* 1960 Vol 2 (3) pp 464-467 (Sep) (Original in Russian)

4 illustr.

See *Industr Diam Abstr* 1960 Vol 17 p A211 (Sep).
D *Bdf Ukjz*

Role of microstresses in the plastic deformation of metals

D. M. Vasil'ev, G. I. Arkovenko. *Sov Phys, Solid State* 1960 Vol 2 (3) pp 507-510 (Sep) (Original in Russian)

2 illustr, 6 ref. *D* *Bf Unkc*

The electron microscope D 2 in solid state physics

D. Schulze. *Jena Rev* 1960 (4) pp 131-134 (In English)

Microscopy takes a direct part in investigating the content of dislocations of crystals. Technique is described. 15 illustr, 9 ref.
D *Vwg Wcmf*

Machining characteristics of leaded steel

F. L. Bagley jun, R. Mennell. *ASME, Trans, Ser D, J of Basic Engng* 1960 Vol 82 (2) pp 347-359; *Battelle Tech Rev—Abstr* 1960 Vol 9 (9) p 565a (Sep) (No 10651)
D *Bfd Unp*

A study of grain shape in cemented [sintered] titanium carbides

T. J. Whalen, M. Humenik jun. *Amer Inst of Mining, Metallurg & Petrol Engrs, Trans, Metallurg Soc* 1960 Vol 218 (3) pp 401-404 (June); *Battelle Tech Rev—Abstr* 1960 Vol 9 (9) p 568a (Sep) (No 10699)
D *Rhd Ubb.21*

Niobium, tantalum, molybdenum and tungsten

Anon. *Metal Ind, Lond* 1960 Vol 97 (18) pp 359-361 (Oct 28)

A conference on the four most important refractory metals was held recently in the Dept of Metallurgy, Sheffield University. Papers are listed and abstracted.
D *Ba.231*

Chromium carbide hard metals

V. V. Grigor'eva, V. N. Klimenko. *Tsvetnye Metally* 1960 Vol 33 (1) pp 67-70 (Jan); *Metal Powd Rep* 1960 Vol 14 (10) p 181 (June) (Original in Russian)
D *Rgz*

Boron nitride

P. Popper (British Ceramic Research Assoc). *NRDC Bull* 1960 (17) pp 3-5 (Oct)

A close analogy exists between carbon and materials containing boron-nitrogen, BN. In the pure form there is an analogue of diamond, called 'Borazon', synthesized at very high temperatures and pressures. However, this article is concerned with boron nitride, which is an analogue of graphite, giving its fabrication, properties, and applications. 3 illustr.

See also *Industr Diam Abstr* 1959 Vol 16 p A104 (June); p A227 (Dec). *D* *Bhb*Re*

Thermal motion in crystals and molecules

G. E. Bacon. *Nature, Lond* 1960 Vol 188 (4748) pp 369-371 (Oct 29)

Summarizes papers at the fifth international congress of the International Union of Crystallography held in Aug, 1960, at Cambridge.

D *Bd Td.231*

Machinability forecast

Anon. *New Scientist* 1960 Vol 8 (206) p 1128 (Oct 27)

Prof. J. Datsko of Michigan Univ believes that data on the tensile strength, thermal conductivity, and abrasiveness of materials will enable him to predict machining characteristics of new alloys. Research is being done to establish a quantitative relationship between these properties and machinability. Both new and familiar materials are being studied in the effort to eliminate the research at present necessary to establish reliable data on machining characteristics.

D *Bfx Unp*

Identifying precious stones (XIX). Wir bestimmen Edelsteine (XIX)

Anon. *Gold u Silber* 1960 Vol 13 (8) pp 19-20 (Aug) (In German)

The article describes the essential apparatus for identifying gems, *ie* hydrostatic balance, refractometer, polariscope, dichroscope, microscope, and a supply of heavy liquids. The recognition of colourless stones is possible with the use of a table giving weights, refraction index, and hardness of different stones; the same applies to yellow stones. Tables are given. 4 tables. *A* *Bb Cc W*

Sapphire tests

G. L. Wild, H. Biegel. *Mineralogist* 1960 Vol 28 (9/10) p 186 (Sep-Oct)

The purpose of this short note is to call attention to the results of some tests made with ultraviolet light and X-rays. *D* *Bbd Cz Swc/Bbd Cz Swm*

BP 830,560 **General Electric Co**
(Mar 31, 1955—conv date, USA)
Method of making garnet

Garnet can be formed from hornblende by subjecting the latter, in the presence of a metallic dehydrator, to a temperature above the melting point of garnet, *ie* about 1,250° C, under a pressure of at least 27,000 atm, and preferably up to 40,000 atm, and cooling the material to below the melting point of garnet while under this pressure. The reaction may be carried out in an apparatus, as described in BP 830,210 and also BP 830,743, consisting of an annular member with a cylindrical opening into which two conical punches may be driven in an hydraulic press to obtain the required pressure in the annulus which represents the reaction area. Heating may be effected by electric induction or by heating coils around the annulus. (7 claims). *J* *Bbhb Ct.1456.545*

DIAMOND, ETC, IN INSTRUMENTS

Measurements, machine tools and optical gratings

E. H. Frost-Smith. *Times Sci Rev* 1960 (35) pp 3-5 (Spring)

8 illustr. *D* *Pr Vfd:Tfd*

The application of electronics to industrial metrology

J. Quentin. *Microtecnic* 1960 Vol 14 (3) pp 125-135 (June) (In English)

Among low resolution instruments described are those for measuring surface finish consisting of the measuring head fitted with a fine diamond feeler and a recorder. The head comprises an inductive pick-up or a plate of piezo-electric quartz, the properties of which are such that a current is generated as a function of the variations of pressure exerted on its faces. The diamond feeler is moved slowly along the surface and the recorder provides a curve representing the surface toughness variations on a scale dependent on the feeler's dimensions. Amplifiers indicate simultaneously the amplitude of the irregularities or a mean value according to a given definition. 16 illustr.

D *Ndb Wgf*

Sheffield prepares to meet the future

Anon. *Watchmaker* 1960 Vol 85 pp 52-55 (Aug)

Research has developed a method of measuring cutlery finish by means of a diamond stylus which travels over the surface being tested. As it moves, the stylus picks up minute irregularies which are amplified several thousand times by an electronic device and recorded on a graph. 2 illustr.

D *Az Cx Nfs*

Present techniques of surface roughness measurement. Srand der Oberflaechen-Messtechnik

P. Hoehle, V. Deutsch. *FeinwTech* 1960 Vol 64 (7) pp 247-253 (July) (In German)

Methods and possibilities of roughness measurement are presented. The usual present systems, the M- and E-systems, and the facts ascertained by their means are expounded. A new type of test is described in which highly accurate surface measurements can be made. The Microgeometer 'OMG IIb', built on the principles of this new method, is described. 14 illustr, 19 ref, 2 tables. *A* *Cx.1456/Vs.1456*

Stylii and roughness measurement

F. W. Kahat, C. H. Good. *SAE Paper 195A*; abstr *Tool & Mfg Engr* 1960 Vol 45 (3) p 257 (Sep)

To investigate effects of the stylus tip on measurements, tests were conducted using several different radii on different surfaces. Results indicated that on lapped and polished surfaces a sharper stylus was of no great value: it is not the fineness of the surface that requires a sharper stylus, but some other characteristic. Coarse ground surfaces sometimes show more difference in reading due to stylus radius than fine ground surfaces. It is concluded that the characteristic requiring the sharper stylus could be the included angle of the scratches. Single point tools usually have a wide angle or a nose radius blunter than the stylus, but grinding wheel grit could have a smaller included angle.

D *Cx Tdb Uqbr*

Further development of the NPL prototype instrument for measuring very small bores

P. W. Harrison, G. M. Severn (National Physical Lab). *Machinery, Lond* 1960 Vol 97 (2497) pp 699-700 (Sep 21)

Describes modifications and additions made to the instrument. One of these has been the construction of a smaller stylus comprising a ball of 0.014 in. diameter mounted on a tungsten stem, enabling bores down to 0.02 in. diameter to be measured. For strength, the reduced end of the stem enters a hole in the ball made by electrolytic erosion. Holes down to 0.0008 in. diameter have been made successfully in balls of about 0.014 in. diameter in about 5 minutes. 1 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A144 (June). *D* *Az Cz Tdb We*

The ' DIAVITE ' apparatus for measuring surface finish (working according to the E-system)

Swisstool Ltd, Zurich. *Microtecnic* 1960 Vol 14 (4) p 191 (Aug) (In English)

The measuring head of the instrument, thought to be the only one which works according to the E-System, is described in detail. A diamond stylus is used for surface finish testing. 1 illustr.

D *Cx Nfs Wgf*

Microgeometry of machined metallic surfaces. Microgeometria delle superfici metalliche lavorate

G. Iussich. *Macchine* 1960 Vol 15 (8) pp 733-741 (Aug); (9) pp 809, 811, 813, 815, 817, 819, 821, 823 (Sep) (In Italian)

The instruments and method of surface finish measurements are discussed. 32 illustr, 8 ref, 1 table.

M *Cz Unf W/Cz Unf.1456*

A new micrometer microscope

R. Barer. *Nature, Lond* 1960 Vol 188 (4748) pp 398-399 (Oct 29)

Describes a double-image system in which two images, sheared by a controlled amount, are viewed. The position of contact can be observed with great precision and theoretical calculations have shown that the accuracy of setting may be considerably better than the resolving power. Construction and advantages of this type of microscope are explained. Many modifications of the basic system are said to be possible. 1 illustr, 2 ref.

D *Wcmz*

Microscopic stage simplifies inspection

Edmund Scientific Co, Barrington, NJ. *Purchasing Week* 1960 Vol 3 (35) p 24 (Aug 29)

A rotating stage is recommended for microscopic inspection of very small components and assemblies. An angled mirror gives top and side views of the object on the stage. The unit's size is 2 × 2 × 2 inches. 1 illustr.

D *Qd Vj*

The Maag Gear-Wheel Company Ltd at the International Machine Tool Exhibition, Olympia, London — June 25 to July 8, 1960

Maag Gear-Wheel Co Ltd, Zurich, Switzerland. *Microtecnic* 1960 Vol 14 (3) pp 146-147 (June) (In English)

The HSS-30-BC, a high precision gear grinder, is also suited to grinding and re-sharpening of shaving cutters. Features are listed.

The PHU-60 gear testing machine checks tooth profile and helix angle. The base circle diameter can be set by an optical device to an accuracy of 0.00004 inch. The machine can be supplied either with a mechanically operating recording device, or with an electronic measuring and recording device equipped with two feelers, one for macro-testing and one for micro-testing. The diamond-tipped micro-feeler is used for checking surface finish. A special feeler for checking shaving cutters is also available. 1 illustr.

D *Ad Chcw Pr/Ad Cz Ndb Pr*

Automatic gear tooth checking

Coventry Gauge & Tool Co Ltd, Coventry. *Mech World* 1960 Vol 140 (3496) p 479 (Nov)

The Matrix automatic gear tooth spacing and concentricity checking machine is said to enable exact measurements of these elements to be recorded in a fraction of the time previously needed. After being set up, the machine checks completely a gear for spacing or for pitch circle concentricity, records the results on a graph, and automatically stops itself after indexing through the required number of teeth. 1 illustr.

D *Tz.134:Prs*

Bore measurement

Alfred Herbert Ltd, Coventry. *Tooling* 1960 Vol 14 (10) p 69 (Oct)

The Sigma Boremaster pneumatic plug gauge embodies a new technique in the application of air gauging to the bore inspection. Bores from 0.120 in. to 1.0365 in. diameter can be measured accurately without the need for setting rings, it is claimed. 1 illustr.

D *Az Vfd Wbbg*

Tiltable micrometer with interchangeable anvil jaws

Schneider & Kern, Niedernhall/Wuertt, Germany. *Microtecnic* 1960 Vol 14 (4) p 190 (Aug) (In English)

Describes construction and possible applications of a precision micrometer designed to overcome the disadvantage of restricted measuring range associated with conventional instruments. Tilting axle permits movement of the various jaws in the plane of the frame front and parallel to the measuring flat of the spindle. This tilting movement, while not affecting precision, allows measurements to be made where the measuring points are not aligned to the same axis or are not in the same plane. Standard equipment comprises six jaws, allowing the micrometer to be used on a table or as a stand instrument. Uses of the various jaws are indicated. 1 illustr.

D *Wbd*

New products and processes : optical comparators

Heston Aircraft & Associated Engineers Ltd. *Times Rev Ind* 1960 Vol 14 (164) (New Series) p 36 (Sep)

Optical comparators which speed up many inspection processes and further the early detection of machining faults are becoming a feature of production lines. Three such instruments are described here, each designed specifically for use on the workbench, in the production inspection department, and in the toolroom or standards room. The first model, the Heliscope, is a simple direct projection optical comparator for inspecting gears, small close-tolerance parts, et cetera. The Vertex is a reflex version of the Heliscope and has greater projection powder, while the Revelation is a more complicated instrument which can examine the profile and surface of the walls and bores of holes up to 3 in. depth. 2 illustr.

D *Ceq Qd Wcz*

Mergar precision tap comparator

Mercer & Garside Ltd; Buck & Hickman Ltd, PO No 74, Whitechapel Rd, London E 1. *Machinery, Lond* 1960 Vol 97 (2497) p 695 (Sep 21)

Although primarily intended for checking the effective diameter of B.S.W., American, unified or metric thread taps, with any number of flutes, this precision tap comparator also enables errors in such features as concentricity and radial relief to be detected. In addition, it can be used for the inspection of tools such as thread milling cutters, fine pitch gear hobs, and reamers. It will accommodate tools between ¼ and 2 in. diameter with overall lengths up to 9 inches. 1 illustr.

D *A Qd Wb*

Covel optical comparator uses micrometers of one inch travel

Covel Mfg Co, Benton Harbor, Mich. *Amer Mach* 1960 Vol 104 (17) p 286 (Aug 22)

The stage of Model No 30, which has an 8 × 24 in. table, has micrometers of one inch travel for measuring both the horizontal and vertical planes, with provision for measuring rods or gauge blocks for the balance of the stage travel. The optics are arranged for an upright image of all magnifications. Standard lenses available are 10, 20, 31¼, 50, and 62½ power. 1 illustr.

D *Wcz*

Super-fine precision measurement

Micro-Line Inc, 7 Osmer St, Jamestown, NY. *Mach Tool Blue Bk* 1960 Vol 55 (10) p 257 (Oct)

A new photographic imaging technique in the field of precision measurement is independent of screw, slide, or propelling mechanisms and is easily attached to milling machines, jig borers, grinders, et cetera. The process is said to make possible photo reductions of a million or more diameters without distortion. 1 illustr.
D *Pr Psc Vfd*

Contact arm with Mikrokator for the quick and precise measurement of cylindrical parts. Messbuegel mit Mikrokator zum Schnellen und genauen Messen zylindrischer Teile

C. E. Johansson AB, Eskilstuna/Sweden. *Draht* 1960 Vol 11 (9) p 621 (Sep) (In German)

This combination of the CEJ contact arm No 152b with the precision instrument CEJ-Mikrokator 500 is designed for the exact measurement of outside diameters. The curve of the instrument allows measurements to be taken close to the grinding wheel. The best results are achieved when the workpiece is stationary. 1 illustr.
A *Ag Vfd Wb*

Measuring instrument for analyzing threads

Pratt & Whitney, W Hartford 1, Conn. *Mach Tool Blue Bk* 1960 Vol 55 (10) p 250 (Oct)

The Helical Path Analyzer analyzes both linear and 'drunken' deviation from the true helical path of thread plug gauges or similar precision threaded parts. It can check deviations to an accuracy of 0.00003 in. over three revolutions on external precision threads. The results are recorded graphically on a chart recorder and indexing is continuous and automatic. 1 illustr.
D *Wbbg*

Slicing microscope specimens

Cambridge Instrument Co, London SW 1. *New Scientist* 1960 Vol 8 (205) p 1061 (Oct 20)

The Huxley microtome is wholly mechanical and does not rely on thermal expansion to advance the specimen at each stroke of the knife. To avoid vibration, the instrument is manually operated: operation is explained. The microtome is said to cut specimens from 100 Angstrom units.
D *Bfa Cej Pdm*

HARDNESS AND WEAR TESTING

Hardness testing of cold rolled carbon and low alloy steel strip

G. Molinder. *Jernkontorets Annaler* 1960 Vol 144 (4) pp 297-327 (In English, abstr in Swedish)

The Vickers method of hardness testing is described in detail. Faultless diamonds should be carefully selected. Difficulties in ensuring adequate precision in measuring the impression diagonal are discussed. For testing cross-sections of strip, the upper surface of the specimen should be ground plane-parallel with the lower surface, made smooth with fine emery paper, and preferably polished like a micro-specimen. The diamond should meet the centre of the strip cross-section. Testing on strip surface is also described. Rockwell methods are compared with Vickers methods over which they are said to have several advantages. 18 illustr, 8 ref, 6 tables.
L *Cvd Nde.1456/Cvd Unhcc.1456*Cvd Unhcd.1456*

The diamond pyramid hardness of sodium borate glasses as a function of their composition and heat treatment

F. C. Eversteijn, J. M. Stevels, H. I. Waterman (Delft Univ). *Phys Chem Glasses* 1960 Vol 1 (4) pp 134-136 (Aug)

Diamond pyramid hardness was determined for both quenched and annealed sodium borate glasses, measurements being done with a Durimet-Leitz hardness meter. Testing technique is explained. Results are shown in a table; each of the values shown was deduced from measurements on four specimens of the same glass, which had been subjected to loads varying from 35 to 75 grammes. Hardness values for quenched and slowly cooled glasses are shown as a function of their composition. Conclusions are recorded, the results being used to reconcile differences of opinion existing in the literature of the subject, while stressing the relationship between viscosity and hardness for different types of glass. 2 illustr, 6 ref, 2 tables.
D *Bm Cvd Nde*

Portable apparatus for determining the hardness of large parts by impression with a diamond pyramid

L. M. Feigin. *Zav lab* 1960 Vol 26 (2) pp 233-235; *Library of Congress Mthly Index Russ Access* 1960 Vol 13 (5) p 1638 (Aug) (Original in Russian)
D *Nde Wghc*

The indentation hardness of diamond. Die Eindringhaerte des Diamanten

A. M. Shams El Din, H. J. Rodewald. *Schweiz Arch angew Wiss* 1960 Vol 26 (6) pp 250-253 (June) (In German)

The new theory developed in a preceding article [*Industr Diam Abstr* 1960 Vol 17 p A213 (Sep)] has served to interpret six measurements of micro-hardness by indentations in diamonds, where the values seemed to be difficult to reconcile. Independently of the load and the shape of the indentation, the six measurements covered a given range. In spite of experimental difficulties, the importance of this dispersion of values is considered to be due less to errors of measurement than to a variable hardness of the diamonds used to make the indentations and those on which they were made, and to the non-observation of the anisotropic character of the hardness. Finally, a simple method of establishing a corrected hardness figure and the constant 'k' from two pairs of values is given. This is said to be the first time that a simple method has been available for establishing absolute hardness figures from micro-hardness measurements. 7 ref, 2 tables.
A *F Unhc*

Effect of the exposure time on hardness measurement by the HRC scale

S. S. Stepanov. *Izmeritel'naya Tekhnika* 1960 (5) p 15 (May); *Soc Sci in Transl* 1960 Vol 4 (5) p 22 (July) (Original in Russian)
D *Cvd Unhcd*

Analysis of methods for investigating microhardness by Birbaum scratching

M. M. Khrushchov, M. A. Babichev. *Zav lab* 1960 Vol 26 (1) p 82 (Jan); *Sov Sci in Transl* 1960 Vol 4 (1) p 15 (Mar) (Original in Russian)
D *Cvb.1456*

Effect of gage on Rockwell hardness testing of brass strip

D. E. Trout. *Proc Amer Soc Test Mat* 1959 Vol 59 pp 212-229; *Battelle Tech Rev—Abstr* 1960 Vol 9 (9) p 561a (Sep) (No 10595)
D *Bfxg Cvd Unhcd Wbb*

The how and why of microhardness testing

V. E. Lysaght (American Chain & Cable Co). *Metal Progr* 1960 Vol 78 (2) pp 93-97, 122, 124 (Aug)

A comprehensive report on the characteristics and limitations of the two most important types of microhardness tests, the diamond pyramid hardness and the Knoop methods. Two types of tester are available: one operates through the direct application of load by dead weight or weights and lever, and the other is spring-loaded. The Tukon tester is in the first group. A typical instrument described has either a Knoop diamond indenter or a 136° diamond indenter and can apply loads from 1 to 1,000 grammes. Set-up and operations are explained. Various kinds of optical equipment and calibration of the optical system are described. The Knoop and 136° diamond pyramid indenters are distinguished, the diamonds themselves being described in detail. Also covered are surface preparation and the dependence of hardness number on load. The author considers that micro-hardness testing may become a useful industrial tool, as well as being in common use in many laboratories. 3 illustr.

D *Cvdb Nde*Cvdb Ndg*

Where to use microhardness testing

V. E. Lysaght (American Chain & Cable Co). *Metal Progr* 1960 Vol 78 (3) pp 121-125 (Sep)

Covers actual and potential applications of microhardness testing under six categories: (*i*) small precision parts; (*ii*) surface layers; (*iii*) thin materials and small wires; (*iv*) exploration of small areas; (*v*) hardness of constituents; and (*vi*) hardness near the edge, *eg* tool steels and cutting tool tips. It is concluded that, although it is unlikely to replace the standard Rockwell and Brinell methods, micro-hardness testing seems certain to become an invaluable supplement to them in industry. 5 illustr, 1 table.

D *Cvdb.21*

Clarify your heat treating specifications!

L. J. Haga. *Metal Progr* 1960 Vol 77 (6) pp 117-119 (June)

A table shows the limiting thickness of material that can be checked safely using the various hardness scales, *ie* diamond and ball Standard Rockwell and Superficial Rockwell. Correct testing techniques are described and a second table gives Rockwell hardness corrections for round work. 1 illustr, 3 tables.

D *Cvd Ndg/Cvd Td:Rw*

Carbide hardness

C. O. Smith. *Metal Progr* 1960 Vol 77 (4) pp 207A-208 (Apr)

Digest of 'A co-operative study of the hardness testing of cemented carbides', ASTM Preprint No 79.

Describes the efforts to standardize testing procedures, starting with a co-operative study by fourteen companies. This was centred on the Rockwell hardness test using a Brale diamond indenter under a 60 kg load with hardness indicated by the Rockwell A scale. Evaluation of procedure and conclusions reached are recorded.

E *Bkc Cvd Ndg*

Determining decarburization depth—nondestructively

F. Phillips (Boeing Aircraft Co). *Tool & Mfg Engr* 1960 Vol 45 (4) pp 119-120 (Oct)

This method avoids the inconsistent results obtained by the visual method, is as reliable as the microhardness method, and has the advantage of being nondestructive and considerably faster, it is said. Using an in-tolerance Rockwell Tester, a trained operator determines surface and core hardness values. These values are converted to depth readings by use of the nomograph. 3 illustr.

D *Cvd Unhcd*

The decarburisation of steel wire

P. Fischer. *Wire World Internat* 1960 Vol 2 (4) pp 177-185 (Sep)

The effect of surface decarburization on chipless and chip forming processes and on hardening distortion of steel wire is discussed. Examples are given to show the effect on surface hardness. Hardness tests were made on decarburized heat-treated and hardened components. In the Vickers tests, it was seen that even with larger loads the edges of the impression were no longer sharply defined. Hardness tests on a piece of wire, flattened after hardening, were measured with a Vickers diamond and the values obtained were converted into Rockwell C units. The core hardness of 59.5 Rockwell C was not even reached with a test load of 100 kg, although the diamond penetration depth of 0.081 mm was greater than the decarburization depth. Effects of decarburization on other properties of steel wire are covered and conclusions recorded. 28 illustr, 14 ref.

D *An Bfd Cvd Nde*

Metallographic techniques for . . . age hardening high-temperature alloys

R. P. Morenski, N. S. Pitea. *Metal Progr* 1960 Vol 77 (3) pp 99-100 (Mar)

Nickel-base super-alloys containing titanium were hardened and the metallography needed to reveal changes in micro-structure which accurred in one such alloy is described. Diamond pyramid hardness values of the specimens at different temperatures are recorded. Rough and fine grinding with silicon carbide paper is described, as well as rough and final polishing.

L *Bfxp Chc Rgc/Bfxp Cvd Nde*

Hardness tests on hard and brittle sprayed coatings. Haertemessung von harten und sproeden Spritzueberzuegen

K. Kirner. *Z Metallk* 1960 Vol 51 (7) pp 391-393 (July) (In German)

General experiments with hardness tests on hard and brittle coatings are reported. Vickers methods were found to be more suitable than Knoop. 2 illustr, 1 table.

A *Bz Cvd Nde*Bz Cvd Ndg*

Yield phenomena induced in rolled zinc by the addition of cadmium. Fenomeni di snervamento indotti nei laminati di zinco daaggiunte di cadmio

P. Gondi. *Metallurg Ital* 1960 Vol 52 (4) pp 152-163 (Apr) (In Italian)

Two illustrations show clear indentation marks for measuring the micro-hardness and the results obtained in the tests are given. 17 illustr, 22 ref, 4 tables.

M *Cvd Nde*

Experiments on the precipitation and hardening of an aluminium-germanium-alloy. Untersuchung ueber die Ausscheidung und Aushaertung einer Aluminium-Germanium-Legierung

H. Boehm. *Z Metallk* 1960 Vol 51 (7) pp 409-413 (July) (In German)

The precipitation hardening of an aluminium alloy with 5% germanium was investigated by means of hardness and conductivity tests, and also by microscopic and X-ray techniques. 7 illustr.

A *Bfxc Cv*

REQUESTS FROM AMERICA

American readers who wish to order a photostat or reprint of an article abstracted in Industrial Diamond Abstracts are advised to apply directly to the appropriate journal if this is an American publication.

Slide rules for the calculation of standard values in Vickers hardness tests. Rechenschieber zur Bestimmung von Richtwerten bei der Vickers-Haertepruefung

H. Gut. *Werkst u Betr* 1960 Vol 93 (8) pp 489-490 (Aug) (In German)

Instructions are given for the use of a slide rule in calculating values from hardness test measurements made with a regular four-sided diamond pyramid with square side 'a' and a wide angle of 136 degrees. 6 illustr. *A* *Cvd Nde Wbz*

Universal hardness testing machine. Universal-Haertepruefmaschinen

Karl Frank GmbH, Weinheim-Birkenau. *Werkstattstechnik* 1960 Vol 50 (8) p 430 (Aug) (In German)

The Frankoskop No 532 makes Rockwell, Brinell, Vickers, Knoop and Grodzinski hardness tests. An optical instrument can be set in the indenter position in order to project the indentation onto a screen. Objectives with ×20, ×70 and ×140 magnification are available. The load to be applied can be set by means of push-buttons. *A* *Wghc*

Hardness tester for various Rockwell hardness tests. Haertepruefer fuer verschiedene Rockwell-Haertepruefungen

Karl Frank GmbH, Weinheim-Birkenau. *Werkstattstechnik* 1960 Vol 50 (8) p 434 (Aug) (In German)

The Duplex No 506 can make tests of Rockwell and also Super-Rockwell hardness. An initial load of 10 or 3 kg and principal load of 60 to 100 kg or 15, 30, and 45 kg can be applied. As well as a Rockwell cone, a 1/16 in. ball can be used to make the text. *A* *Unhcd Wghc*

Hardness testing devices

American Chain & Cable Co Inc, Wilson Mechanical Instrument Div, Bridgeport 2, Conn. *Mod Mach Shop* 1960 Vol 33 (4) pp 330-332 (Sep)

The Twin Tester is capable of determining the hardness of metals in both the Rockwell and the Rockwell Superficial scales. The instrument is designed for use in laboratories and tool departments where limited use of hand-operated Rockwell testers is required. *L* *Unhcd Wghc*

TRUING OF GRINDING WHEELS

On the use of diamond truing tools for grinding wheels II. Over het gebruik van afdraaidiamanten voor slijpstenen II

H. J. Otterloo. *Metaalbewerking* 1960 Vol 26 (7) pp 127-131 (Sep 29) (In Dutch)

General hints on the practical use of single diamond truing tools are given, including careful mounting, the use of coolants, care and maintenance of the diamond, and carat size of truing diamonds. It is difficult to form set rules regarding the ideal carat size, but certain suggestions which have been found satisfactory in practice are given. The use of too small a diamond on a large wheel will lead to over-generation of heat, and this may lead to fracture. It is suggested that a control chart be kept for each truing tool, with a description of the stone, the type of machine it is intended for, et cetera. Special applications of diamond truing tools are discussed. *L* *Njb.21*

Practical notes on the finishing of cylinders by a rolling mill. Note pratiche sulla finitura dei cilindri da laminatoio

S. Leporatti. *Macchine* 1960 Vol 15 (9) pp 795-805 (Sep) (In Italian)

The importance of the good condition of the grinding wheel is stressed, with special emphasis on wheel truing with diamond; when using a diamond wheel, the correct grade of diamond impregnation must be adopted for each process. 20 illustr. *M* *Ab Cg Nj/Ag Chm Nv Pr*

Accurate shop testing of diamond wheels

J. W. Ripple. *Industr Diam Rev* 1960 Vol 20 (238) pp 174-175 (Sep)

See *Industr Diam Abstr* 1960 Vol 17 p A6 (Jan); p A213 (Sep). *D* *Nv.1341*

Motorize wheel dressing . . . and records — Cut diamond wheel costs

M. Damerell. *Industr Diam Rev* 1960 Vol 20 (237) pp 154-156 (Aug)

3 illustr.

See *Industr Diam Abstr* 1960 Vol 17 p A239 (Oct). *D* *Nv:Cg Psf Psj/Nv.252*

The care and use of diamond tools

New York Diamond Tool Co Inc, East Orange, NJ. *Industr Diam Rev* 1960 Vol 20 (238) p 178 (Sep)

See *Industr Diam Abstr* 1960 Vol 17 p A213 (Sep). *D* *N.138*

Truing and dressing

Anon. *Industr Diam Rev* 1960 Vol 20 (236) pp 133, 137 (July)

The basic difference between the two processes is that whereas dressing is applied to the wheel surface to remove adhesions of materials that have been transferred from the workpiece and to the wheel, truing is a more drastic process designed to alter or restore the actual shape of the wheel. The mechanisms and effects of the processes are described and the necessity of distinguishing between them in order to avoid confusion is stressed. *D* *Cg*Qec*

Automatic sizing and finishing of rubber rolls

D. Ward. *Grinding & Finishing* 1960 Vol 6 (7) p 40 (July)

The silicon carbide wheel, 30 grit, H grade, 10 structure, was dressed once a day after grinding approximately 1,000 parts. The wheel was stepped with a relief of some 0.010 in. on the leading edge to begin the rough cut, and dressing was done with a single diamond. 2 illustr. *D* *Ab Bkz Cg Njb*

Faster metal removal to millionths—trends in abrasive machining

R. Heslen. *Tool & Mfg Engr* 1960 Vol 45 (3) pp 112-118 (Sep)

Surveys developments in machines, wheels, and techniques of abrasive metal removal, illustrating points with examples of particular machines in operation. The use of diamond paste in finishing a missile cone part is mentioned. The influence of wheel dressing on form grinding productivity is stressed and a fixture using a shaped diamond wheel to produce the required form on the wheel is described. Six million valve stems are claimed to have been the output of one dresser which undertook 200,000 operations. 12 illustr. *D* *Az Chm Kmg/Cgh Nj*

Dressing grinding wheels with diamonds and substitute materials

Anon. *Sowjet Buchneuerscheinungen, Vorankuendigungsdienst* 1960 (23) p 22 (Original in Russian)

Book, Maschgis. 1960, 112 pp. Price DM 1.75.

Discusses the construction of dressing tools with and without diamonds, and makes recommendations for the choice of tools and working methods dependent on grinding conditions. The technique of fixing the dressing diamonds in the tools and the construction of the tools themselves are also considered.

[Not in library of Industrial Diamond Information Bureau].

A *Ab Cg Nj.52/Nj Qc.52/Pf Qc.52*

Recirculating ball nut and screw production expands

K. W. Hards. *Metalworking Prod* 1960 Vol 104 (36) pp 73-76 (Sep 7)

Ball track grinding is carried out on Matrix thread grinders which are fitted with pitch correctors, after all diameters, shoulder and ball track have been ground and stabilized. The wheel is formed with a diamond radius truing attachment and inspected by projection before grinding of the track commences. Infeed varies from 0.005 in. for rough grinding to 0.0005 in. during finishing. 6 illustr.

D *Chcp Pr:Nj Psfc*

New production equipment : Jones-Shipman No 1540 hydraulic surface grinding machine

G. W. Mason, A. J. Barker. *Machinery, Lond* 1960 Vol 97 (2499) pp 793-794 (Oct 5)

The machine is a development of No 540 toolroom surface grinder which it supplements, having a number of features to permit quicker production of ground surfaces. Diaform wheel forming equipment can be mounted on the wheelhead if desired, and other possible additions include Optidress wheel forming equipment. 1 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A96 (Apr).

D *Chcm Prx Psc*

Olympia in close-up — 7

Anon. *Machinery, Lond* 1960 Vol 97 (2494) pp 493-500 (Aug 31)

Among the design features illustrated is the new dressing unit on the Norton type CC-8 crankpin grinder. The unit is of the rocking type and provides for automatically and successively truing one corner radius, the periphery, and finally the other corner radius of the wheel. It is housed above the grinding wheel, within the guard, and easy access for adjusting and setting the movement and swinging radius of the holder is ensured by the hinged door, which is shown open in a photograph. 25 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A276 (Nov).

D *Agn Chc Pr:Njb Psf*

Co-ordinate profile grinding method. Koordinaten-Formschleifverfahren

Svenska Ackumulator AB Jungner, Stockholm. *Werkst u Betr* 1960 Vol 93 (8) pp 483-484 (Aug) (In German)

In a description of profile grinding methods, the co-ordinate profile grinding apparatus Coordiform Type 125 is recommended. In truing the grinding wheel, the worktable can be removed and exchanged for a radial and tangential truing device. The latter is set up independently of the two base-table pivots by means of two grinding pins on the middle of the base plate. The diamond point is always moved round the centre of the indexing head spindle. Wheels for grinding concave shapes may be trued by this apparatus, and a variety of shapes can be produced on the machine. 7 illustr.

A *Chch Pr:Nj Psf*

Ball pins : A new type of set-up for automatic centreless grinding

Arthur Scrivener Ltd. *Industr Diam Rev* 1960 Vol 20 (238) pp 176-177 (Sep)

Describes operation of a set-up for use with the No 2 controlled-cycle centreless grinder. A diamond truing attachment trues the radius on the grinding wheel for form grinding the ball end of the piece. Technique is explained. 4 illustr.

D *Az Chcc Pr:Nj Psfc*

Sheffield Crushtrue multi-form grinder finishes 2-4 parts at 9000 sfpm and up

Sheffield Corp, Dayton, Ohio. *Amer Mach* 1960 Vol 104 (17) p 266 (Aug 22); *Machinery, Lond* 1960 Vol 97 (2495) pp 531-533 (Sep 7)

Model 182 cylindrical form grinder operates a single Crushtrue dressed wheel, or two wheels separated by a spacer, to form two or four parts simultaneously. Part handling, grinding, wheel dressing, and wheel compensation are all automatic. 1 illustr.

D *Chcl Pr Psf.27*

USP 2,914,058 (Aug 21, 1958) **K. Sommer, Sommer & Maca Glass Machinery Co**

Dressing devices

The device is intended for multi-groove wheels used to perform finishing operations on the edges of glass panes, usually of semi-circular cross section. Such wheels were hitherto trued by hand, a slow procedure which never resulted in uniformity of the contours. Fig 1 is a front elevation view of the truing device, Fig 2 an enlarged cross section of part of the device, Fig 4 an enlarged view of a single groove truing tool of the device, and Fig 3 a perspective view, taken from below.

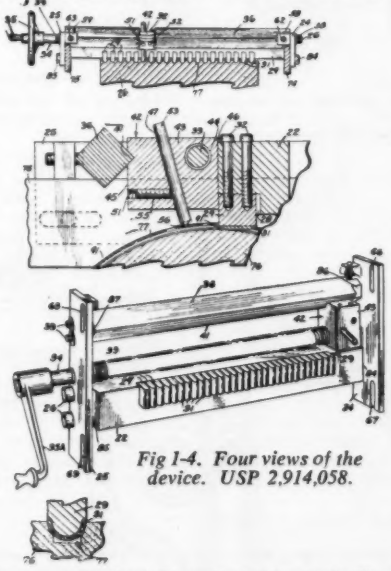


Fig 1-4. Four views of the device. USP 2,914,058.

The grooves of wheel 76 are trued by tools 29 of mild steel impregnated at their edges with 40 grit size diamond dust. The device can be mounted on a glass finishing machine, *eg* of the type described in USP 2,796,707, and the previously lowered wheel 76 raised and rotated against the leading edges 91 of tools 29. Diamond tipped tool 53 is used to true the face of wheel 76 when the grooves have become undesirably deep. (5 claims, 10 illustr). Ref cited : 2 USP.

J *Ab Cgh Nj Psf.545*

BP 829,173 **Herbert Lindner GmbH**
(Sep 14, 1957—conv date, Germany)
Truing devices for thread-grinding disks

When using two truing diamonds in staggered arrangement so that they do not interfere with each other, a comparatively complicated mechanism operating with control cams must be located in a narrow space behind the grinding wheel. The mechanism shown in Fig 5 and 6 has no control cams but works with two rocking levers 8, 9 obliquely adjustable to the grinding wheel 1. The two levers carrying diamonds 4, 5 are of different length and are displaced in their plane so that their movement can be controlled by a single control plate 12. The plate is located on driving bolt 15 which is reciprocated through pinion 19 on shaft 20 meshing with teeth 18 on bolt 15 by hand lever 21 and return spring 17. The lever axes are axially adjustable in their bearings and angularly adjustable to different flank profiles. (6 claims, 3 illustr). *J* *Abmb Cg Njc Psf.545*

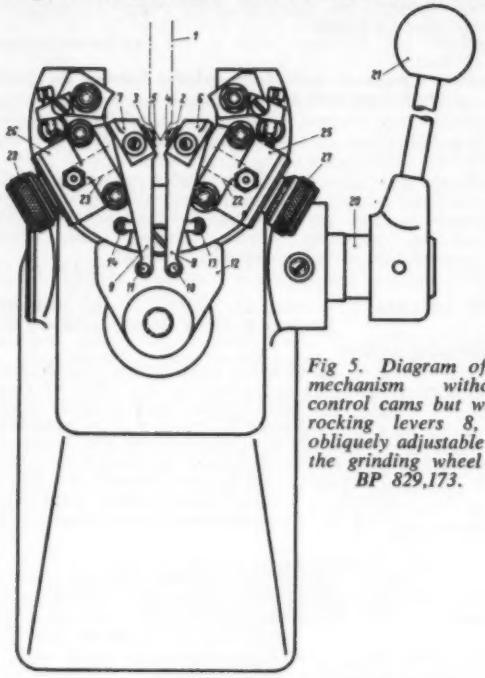


Fig 5. Diagram of a mechanism without control cams but with rocking levers 8, 9 obliquely adjustable to the grinding wheel 1. BP 829,173.

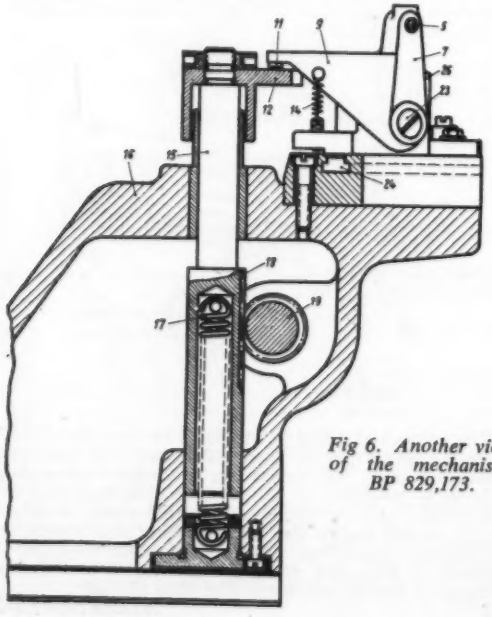


Fig 6. Another view of the mechanism. BP 829,173.

USP 2,926,652 (Sep 16, 1958) **L. Duncan**
Grinding wheel dressing

When the same diamond is used for truing the peripheral face of a grinding wheel and radii at its edges, as has been the practice hitherto, the close tolerances required nowadays in certain jobs cannot be kept as the wear of the diamond passing across the face will prevent this. Therefore two diamonds are used, a heavy diamond for face truing and a light diamond for radius truing. The face truing diamond 22 in Fig 7 is mounted ahead of radius truing diamond 24. Diamond 24 is held in holder 28 and is shown in Fig 8 at the edge of the wheel with diamond 22 having completed its passage so that diamond 24, which just touches the trued face of the wheel, can be moved round the edge into its end position as is shown in a dashed line. (3 claims, 5 illustr). Ref cited : 1 USP.
J *Ab Cgh Nj Psfc.545*

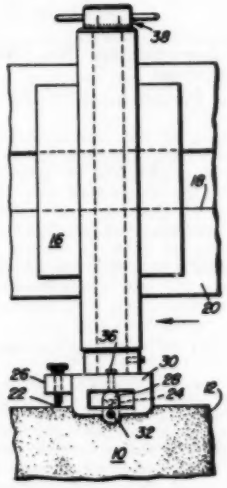


Fig 7 (left). Face truing diamond 22 is shown mounted ahead of radius truing diamond 24.
Fig 8 (below). A stage in the truing cycle.
USP 2,926,652.

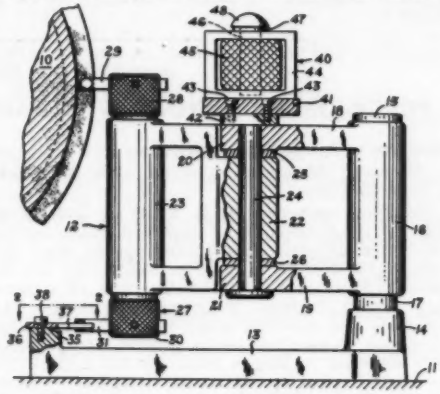
FP 1,211,273 **F. Fenocchio**
(Dec 18, 1957—conv date, Italy)
Diamond tool for truing grinding wheels. Outil muni de diamants pour l'avivage de mules abrasives

The tool holder is provided with a roller at its end with a cylindrical surface in which uniformly spaced diamonds are inserted. The roller is secured to the holder by a screw to be tightened before use. When the diamonds thus presented to the wheel are worn down, the screw is loosened, the roller turned, and the screw tightened again so as to present new unused diamonds to the wheel. (2 claims, 3 illustr).
J *Ab Cg Nj.545*

USP 2,926,653 (Sep 18, 1958) **F. G. Krafft, Thompson Grinder Co**

Grinding machines

Profile truing when the truing diamond is guided by a stylus moving along a template is frequently slightly inaccurate because of the tendency of the stylus to 'stick-slip' along the template and thus cause jerky movements. This can be avoided by imparting rapid vibrations of small amplitude to the device. Fig 9 and 10 show an example of such a device with diamond



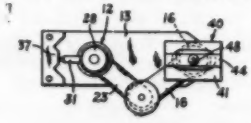


Fig 9 (above) and 10. The profile truing device with vibrator 40. USP 2,926,653.

tool 29 following the movements of stylus 31 along template profile while armature 46, loosely received in electric energizing coil 45, causes vibrator 40 fixed to the truing device to overcome the friction between stylus and template. (6 claims, 3 illustr). Ref cited: 5 USP.

J *Ab Cgh Nj:Chc Pr.545*

Swiss P 340,399 S. G. Brady, Gear Grinding Machine Co (Oct 3, 1955—conv date, USA)

Mechanism for truing the grinding wheel of a gear cutting machine. Mécanisme pour rectifier la meule d'une machine à tailler des roues dentées

The mechanism as represented in Fig 11, 12 and 13 actuates two diamonds with two pantographs whose followers roll along templates with guiding faces

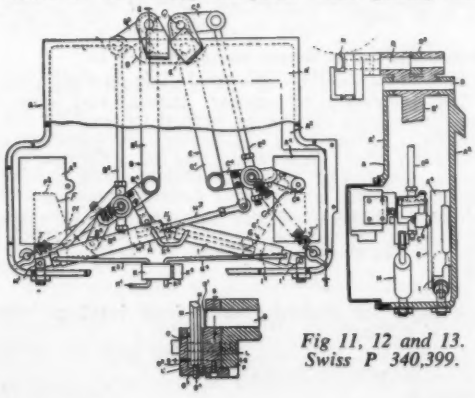


Fig 11, 12 and 13. Swiss P 340,399.

corresponding to the opposite flanks of two teeth and the clearance space between the roots of the teeth. The movements of the diamonds are out of phase so that they do not interfere with each other. Diamond N is clamped in block L adjusted by screw O4 while the block itself is pivotable about fixed shaft Q. The pantographs B and C are moved by fluid pressure through cylinder and piston H and I. The templates are F and G. The followers are held in contact with the guiding faces of the templates by springs J and J' and roll over portions F', F² and G', G². (6 claims, 7 illustr).

J *Abmd Cg Njc Psf.545*

FP 1,206,383 (Aug 14, 1958) **G. Gros**

Method of mounting diamonds in tools and tools obtained by the method. Procédé demontage d'outils à base de diamant, et outils obtenus par ce procédé

Several diamonds of triangular form are fixed side-by-side in a tool so that they present alternately an edge or a point to a wheel to be trued. The result of this arrangement is that, by orientating the tool around its axis and keeping it perpendicular to the work face, it is possible to present the diamond aligned either parallel to the plane in which the grinding wheel rotates, or perpendicular to it, or in any of intermediate positions. The diamonds are embedded in a sintered alloy bond in a tool holder as known. The diamonds may be arranged as in Fig 14 with their edges in radial arrangement, or as in Fig 15 in rectangular form. (2 claims, 4 illustr).

J *Njd 545*

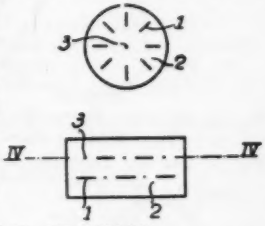


Fig 14 (top) and 15. FP 1,206,383.

FP 1,207,780 (July 11, 1958) **K. Hack**

Device for the automatic truing of the grinding wheels of machines for grinding the ends of springs. Dispositif pour le dressage automatique des meules des machines à meuler les extrémités de ressorts

The truing of grinding wheels for the ends of springs is a difficult job because the two wheels have to be positioned very accurately to a theoretically calculated distance and great experience is needed in choosing a feed which neither damages the truing tools nor makes the wheels unusable prematurely. Therefore, truing and positioning takes a very long time and must be done by specialists. In order to automatize the truing and re-positioning of the wheels and/or truing tools, feelers are associated with the tools which automatically adjust the feed and automatically position the tools and/or wheels. The adjustment may be effected by mechanical, electrical or any other means. A measuring table is an integral part of the work table and stops are provided for precision control of the truing position and the feed by feeler contact. The specification describes a hydraulic arrangement. (10 claims, 1 illustr).

J *Abm Cg Psf:Ad Chc Pr.545*

DIAMOND TECHNOLOGY

First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 226 Latymer Court, London W 6. 54s 6d, post free.

FP 1,207,683 **Zahnradfabrik Friedrichshafen AG** (July 5, 1957—conv date, Germany)

Truing device for profiled grinding wheels used for grinding involute gear wheels with helical teeth. Dispositif pour dresser les meules profilées destinées à la rectification de pignons à denture hélicoidale à développante

Previous designs required either very complicated mechanisms or they easily led to errors. The new device operates with a truing tool on a control plate,

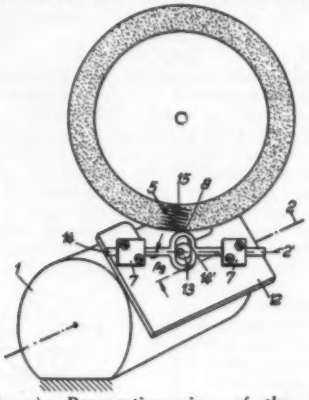
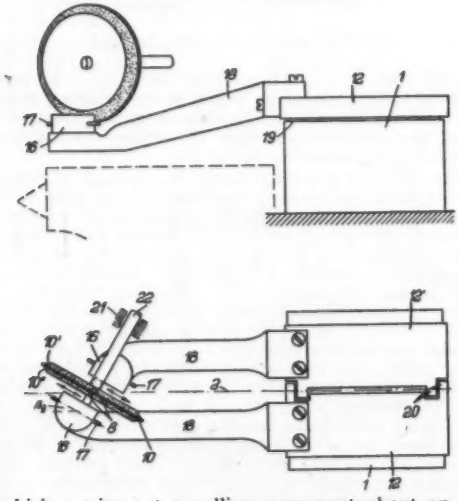


Fig 16 (above). Perspective view of the arrangement showing diamond point 8.

Fig 17 and 18. Diagrams of an arrangement with two diamond tools. FP 1,207,683.



which carries out a rolling movement about an axis inclined to the axis of the wheel corresponding to the helix: thus the tool, if it is pointed like a diamond, is simultaneously reciprocated on the control plate inclined at the same angle to a line parallel to the axis of the rolling movement. Fig 16 is a diagrammatic perspective view of the arrangement of diamond point 8 reciprocated by eccentric 13 on control plate 12 rolling on cylinder 1 about axis 2 and cutting zig-zag line 15. An arrangement with two diamond tools is shown in Fig 17 and 18 with rolling plates 12, 12' carrying tool arms 18. Both plates roll in the same arc 1 and are held on bands 19. (8 claims, 8 illustr).

J *Abm Cg Psf:Ad Chc Pr.545*

DAS 1,077,507 (July 5, 1957) **J. Looman, H. Hofer, W. Thiemig, Zahnradfabrik Friedrichshafen AG**

Truing device for profiled grinding wheels used for grinding involute gear wheels with helical teeth. Vorrichtung zum Abrichten von profilierten Schleifscheiben zum Schleifen von schraegverzahnten Evolventenstirnrädern

See FP 1,207,683 (7 claims, 8 illustr); *Industr Diam Abstr* 1960 Vol 17 p A312 (Dec).

J *Abmd Cgf Nj Psf.545*

PRECISION MACHINING OF METALS

Machining at five surface ft per min

D. Fishlock. *Metalworking Prod* 1960 Vol 104 (39) pp 74-76 (Sep 28)

Describes operations at S. Smith & Sons (England) Ltd for the production of clock and watch parts which are often so small that cutting speeds must be low. About 100 bar-fed Swiss type automatics are in use. Materials are steels and brasses, and all components are turned initially to required accuracy so that machine and material control is necessarily exacting. Tungsten carbide tooling is general, except for drills, but diamond tooling is used for the highest finishes needed. Typical operations are described. 4 illustr.

D *Az Ceq Nf/Az Ceq Pdc*

The use of high frequency motors in precision machining. Der Einsatz von Schnellfrequenzmotoren in der Fertigung der Feinmechanik

H. Saule. *Feinmechanik u Optik* 1960 Vol 77 (9) pp 258-261 (Sep) (In German)

The advantages and limitations of these motors are discussed. It is pointed out that in precision operations using diamonds, work with a greater radius can be done and high speeds achieved. Infinite variation in revolution speed is possible. Examples of practical application are considered. 7 illustr, 1 table.

A *Chm Nv Pr Psj*

Letters to the editor

I. S. Shtenberg *et al* (Lipetsk Tractor Factory). *Machines & Tooling* 1960 Vol 31 (5) p 39 (Original in Russian)

The question of turning with oscillating tools is considered by the writers, who question the conclusions reached in an article on the subject which appeared in *Machines & Tooling* in 1959.

See *Indústr Diam Abstr* 1960 Vol 17 p A99 (Apr); p A166 (July). *D* *Ceqb Pd Qnj*

Fundamentals of economic manufacture — 18

W. F. Walker. *Tooling* 1960 Vol 14 (10) pp 47-57 (Oct)

The generating of angular, convex, and concave profiles to close dimensions, without the need for using templates, is becoming a common-place operation on the turret lathe. With attachments for performing such work, the cutting tool is contained in a specially designed holder, and various devices, operating from either the turret or cross-slide, cause the single point tool to follow a pre-determined path and so generate the required contour. 14 illustr.

D *Ceqg Pr*

Mechanisms for protecting drills from breakage when deep drilling

V. I. Shekhter. *Machines & Tooling* 1960 Vol 31 (5) pp 36-37 (Original in Russian)

2 illustr. *D* *Cfb Pl Psc.138*

Versatility and efficiency make band saws a profitable tool. Pt 3 — Band saw blades

D. Ward. *Mach Tool Blue Bk* 1960 Vol 55 (10) pp 126-134, 136, 139-142, 144, 166-168 (Oct)

Six reasons are given for considering band sawing a profitable, precise method of cutting stock, these being summarized as: continuous cutting, simple fixturing, maintained sharpness, less horsepower and material waste, and unrestricted machining geometry. Advice is given on tool selection and usage. 10 illustr, 9 tables.

D *Cej Pcz.21*

Turning 'plain' carbon and sulphurised 'free machining' steel with H.S.S. tools

Anon. *Pera Bull* 1960 Vol 13 (9) pp 231-233 (Sep)

D *Bfd Ceqb Pdb*

Hot machining cuts producibility barrier

Anon. *Steel* 1960 pp 106-109 (June 20); *Pera Bull* 1960 Vol 13 (9) p 238 (Sep)

Machining a workpiece heated to 900° F has been found to increase tool life and cutting efficiency when turning and milling, but not when drilling.

X *Ceq Uqe Vbb*

Machining the unmachinable . . . cutting tungsten with carbides

F. J. McGee. *Tool & Mfg Engr* 1960 Vol 45 (4) pp 79-82 (Oct)

Pure tungsten, generally considered unmachinable except by grinding, can be cut by silicon carbide cut-off wheels and tungsten carbide tools. Various machining operations are described. 5 illustr.

D *Bfp Ceg Pdc*

How to get the most out of turret drilling

Anon. *Canad Mach & Metalworking* 1960 Vol 71 (7) pp 73-74 (July)

4 illustr. *D* *Cfbz.21*

The use of ceramics for machining. Einsatz der Schneidkeramik in der Fertigung

H. Woepkemeier. *Industr Anzeig* 1960 Vol 82 (80) pp 1349-1353 (Oct 4) (In German)

The development and uses of ceramics for machining are discussed. There is a tendency towards using more moderate cutting speeds. The cutting speed ratio of hard metal to ceramic is 1 : 2 or 1 : 3, and it is not advisable to cut under 80/m/min with ceramic. Over high speeds require additional measures, however, particularly protective ones. The use of oxide ceramic is not necessarily limited to new machines; machines that are statically and dynamically satisfactory under pressure are also suitable. 17 illustr.

A *Pdd Uqfb/Pdd.132*

Milling and cutting-off in one pass

Anon. *Mach Shop Mag* 1960 Vol 21 (10) p 630 (Oct)

An illustration shows a method of milling a slot in square section brass and cutting-off on one operation, using standard milling cutters. 1 illustr.

D *Bfxg Cegc/Bfzg Cff*

Carbide countersinking drill for cleaning centre holes

V. Rochek. *Machines & Tooling* 1960 Vol 31 (5) p 38 (Original in Russian)

For the operations which follow heat treatment, it is necessary to clean up and correct centre holes in components. A special carbide tipped countersinking drill has been designed for this purpose which, due to its great wear resistance, is more economic than conical grinding wheels used for this operation. 1 illustr.

D *Az Plj Rg*

How to fabricate A-286

L. J. Hull. *Metal Progr* 1959 Vol 76 (6) pp 76-80 (Dec)

A short section deals with the machining of this super-alloy. It is difficult to machine as it resembles an austenitic alloy that work hardens rapidly. A-286 is slower to machine than the 300 series of stainless steel, but can be machined more rapidly if the material is in an aged, partially aged, over-aged or cold worked condition. Carbide tool bits with a 7° positive rake have successfully cut solution-treated A-286 to depths of 0.010 in. or more at about 100 surface ft/minute. 2 illustr, 2 tables.

L *Bfxz Ceq Pdc*

Metal cutting

C. O. Smith. *Metal Progr* 1960 Vol 78 (2) p 170 (Aug)

Digest of 'A critical comparison of metal cutting theories with new experimental data' by S. Kobayashi, R. P. Herzog, D. M. Egglestom, E. C. Thomsen. ASME Trans Paper No 59-A-131.

D *Bf Ceg*

The machining of heat-resisting and titanium alloys

W. A. Kriwouchow. *Sowjet Buchneuerscheinungen, Vorankuendigungsdienst* 1960 (23) p 22 (Original in Russian)

Book, Mashgiz. 1960, 304 pp. Price DM 5,50.

Discusses tool wear and durability; cutting strengths and surface quality; conditions in the cutting area; choice of coolants and lubricants, and methods of applying them.

[Not in library of Industrial Diamond Information Bureau]. *A* *Bfxn Ceq Pd Uqe.52*

Do's and don'ts in machining titanium

Anon. *Western Metalworking* 1960 pp 27-29 (Mar); *Pera Bull* 1960 Vol 13 (9) p 240 (Sep)

D *Bfn Ceq.1456*

Multiple spindle drilling and tapping equipment

Commander Mfg Co, 4224 West Kinzie St, Chicago 24, Ill. *Mod Mach Shop* 1960 Vol 33 (4) pp 361-362 (Sep)

The Commander Model 'A' multi-angle drill unit is self-actuating and can be adapted to a variety of power sources. The small size, 1½ in. diameter, and long stroke of the drill enable quick set-ups to handle almost any angle or special drilling job, it is said.

L *Cfb Pr.27*

Unique design permits rotation of entire diamond tool

Staset Co Inc, 66 Franklin Ave, West Orange, NJ. *Grinding & Finishing* 1960 Vol 6 (7) p 56 (July)

Claimed to be a new concept in diamond tool design, Turn-A-Tool provides an easy and practical way of keeping the diamond sharp by turning of the tool from 0° to 360° by the operator. This feature is said to eliminate wear at the bearing surface and ensure constant tension. The design utilizes the entire tool and can be applied to all diamond tool styles, it is stated. 1 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A245 (Oct). *D* *Mf N*

Improved diamond-quill bonding cuts freer, lasts longer

National Diamond Lab, Peekskill, NY. *Amer Mach* 1960 Vol 104 (17) p 528 (Aug 22)

A diamond impregnated quill has an improved bond which is said to permit freer cutting because it is exposed from the body of the quill: bonding and manufacturing technique allows about 1½ times the girth of the diamond to protrude from the bonding material. The quill will cut hardened steel without smearing, and, under ideal conditions, it is claimed that forty holes were ground with a 0.109 in. quill.

D *Nqz*

Process produces precision blanks with straight, smooth edges in a single operation

Hydro-Cam Engng Co, 1900 E Maple Rd, Troy, Mich. *Mach Tool Blue Bk* 1960 Vol 55 (10) pp 182-183 (Oct)

The Hydro-Cam Smooth-Edge blanking process is said to eliminate the need for shaving operations while producing a surface finish comparable to one achieved by grinding. Gears, precision holes, *etc*, are suited to the process. 3 illustr. *D* *Chcz Unf*

Tiny holes at any machine

Milburn Machine Works, Baldwin, NY. *Amer Mach* 1960 Vol 104 (16) p 2 (Aug 8)

The Turbo-Drill, a new miniature air-turbine attachment, is said to drill hole diameters from 32 down to 1 thousands at any standard drill press, jig borer, miller, or lathe. The turbine drives the miniature spindle at 1,000 rev/min for each pound of air pressure available, reaching speeds of 3,500 to 12,000 rev/minute. Maximum down-feed is ½ in., and the attachment has a ¼ in. shank for mounting in standard machine spindles. *D* *Cfbd Pl*

Automatic hydraulic internal thread cutting machine. Hydrauliener Muttern-Gewindeschneidautomat

Ateliers J. Hanrez SA, Div Material Despaigne, Monceau-sur-Sambre, Belgium. *Draht* 1960 Vol 11 (9) p 628 (Sep) (In German)

Developed especially for the cutting of 4- and 6-sided internal thread parts, this machine works with two independent rotating spindles with curved thread borers, thus permitting the production of two different kinds of nut. 1 illustr.
A *Ceqbd Prx.133*

Hofmann multi-spindle attachment for flute milling

Maschinenfabrik Dionys Hofmann, Onstmettingen Germany; British rep: Adcock & Shipley Ltd. *Industr Diam Rev* 1960 Vol 20 (238) p 173 (Sep)

A universal dividing head has three spindles enabling three components to be milled simultaneously. Spiral milling can be done also, and the attachment is suited especially to milling flutes in spiral reamers, taps, et cetera. 1 illustr. *D* *Cfjz Pr Psl*

The Lodge & Shipley Co

Anon. *Machinery, Lond* 1960 Vol 97 (2495) pp 548-549 (Sep 7)

The Hi-Turn lathe is shown set up for rough and finish turning a conical bottle mould plunger with ceramic tools. Type 2516 20 in. Superturn Preselect lathe is also claimed to take full advantage of current and future developments in tool materials, including ceramics. 2 illustr. *E* *Ceqb Pr.27*

New Swift high-speed ceramic and carbide tool-testing lathe

G. Swift & Sons Ltd, Halifax. *Machinery, Lond* 1960 Vol 97 (2497) pp 675-676 (Sep 21)

Machine capacity is for bars up to 9 in. diameter by 36 in. long. Spindle speeds are from 310 to 5,000 rev/min and is driven by a 40 h.p. motor. All functions can be controlled from a desk-type console. 3 illustr.
D *Ceqb Pr*

Mortimer Engineering Co

Anon. *Mach Shop Mag* 1960 Vol 21 (8) pp 514-516 (Aug)

Describes the Koping SIOC high speed centre lathe, fitted with copy turning equipment, when machining a carbon shaft with a Secoramic ceramic tip. A 5/16 in. deep cut was taken with a feed of 0.010 in./rev and a spindle speed of 1,260 rev/min; surface cutting speed was about 1,400 ft/minute. 4 illustr.
D *Ceqb Pdd Pr.27*

Diamond and carbide tools designed for automatics

Arthur A. Crafts Co, Boston 15, Mass. *Amer Mach* 1960 Vol 104 (17) p 521 (Aug 22)

A diamond commutator turning tool is specially designed for fractional h.p. motors. The tool's hardness and long life reduces tool down-time and eliminates grinding. A carbide tool with ¼ in. sq. bit at 15° shear is designed for cutting aluminium, copper, magnesium, and plastics. A disposable carbide screw tip boring bar is for deep, small holes. The shank is solid carbide for rigidity and tools are available from ¼ in. and upwards.
See also *Industr Diam Abstr* 1960 Vol 17 p A295 (Nov). *D* *Nf.27/Pdc.27*

CUTTING AND MACHINING OF STONE, GLASS, ETC.

The application of diamonds in technology

J. Schultz. *Jena Rev* 1960 (4) pp 139-149 (In English)

Some 80% of diamonds produced are now used for industrial purposes and demand is continually increasing. The author points out that, while synthetic diamond can be used successfully for grinding wheels, for larger tools natural diamonds will long continue to occupy first place. In precision engineering and optical works, diamond impregnated tools are used for attaining the highest precision and economical production; therefore, VEB Carl Zeiss, Jena, manufacture a number of diamond tools which are primarily meant for the firm's own use. The design of the tools described in the article is based, as far as possible, on the experience gained in this production. Types of tool described are: glass cutters, truing tools, core bits for rock drills, multi-grain tools, engraving diamonds, turning diamonds, drills and diamond dies. Industrial uses of diamond powders and the importance of diamonds as precision machine parts, as well as testing and measuring instruments are stressed. The general properties of diamond are outlined and the particular forms of crystal most suited to various operations are discussed. Advice is given on proper use of tools so that the diamond properties can be fully utilized without damaging the diamond. Diagrams and photographs illustrate this comprehensive article. 28 illustr, 4 ref. *D* *F*Fh/F U/Km/N.138*

Improvements in diamond sawing and drilling: The effects of soft soap as a wetting agent and softener

G. B. Dauncey. *Industr Diam Rev* 1960 Vol 20 (237) pp 150, 152 (Aug)

It has been established that a wetting agent or softener added to diamond drill water in an optimum concentration has a marked effect on drill crown performance, and it was decided to investigate this with regard to diamond sawing. Several materials normally cut with diamond were used, and results of sawing with and without a Lever Bros soft soap additive were compared. Tests are described which, though brief, gave sufficient indication that diamond saws can be improved to varying degrees, depending on material worked and additive type and concentration. 1 table.
D *Cej Ng.132/Cfb Nh.132*

Cutting a kunzite

N. Deane. *J Gemm* 1960 Vol 7 (8) pp 294-295 (Oct)

Crystal sawing is done with a very smooth diamond saw since the material is extremely liable to cleave. Grinding and polishing technique is also covered.
D *Bcp Cej Ng/Bcp Chc.1456/Bcp Chm.1456*

VHF crystal polishing and the nature of polished quartz surfaces

I. Ida, Y. Arai. *Rev Electrical Communication Lab NTT* 1960 Vol 8 (3/4) pp 119-174 (Mar-Apr)

The first section covers development of a polishing technique for very thin oscillator plates and the second investigates the nature of the polished quartz surfaces so obtained. A scale model test was devised for secondary flaws by scratching, enabling the deformation processes of scratched and polished surfaces to be compared at the same time as the mechanism of the secondary flaws originated by scratching were studied. Specimens of cut crystals, having been polished under the prescribed conditions, were surface scratched with points such as diamond and sapphire styli or single Norton 'Alundum' abrasive, with loads of 3 to 100 g and scratching speeds of 0.3 to 1.5 mm/sec; a surface roughness meter was used. The origins of secondary flaws produced by scratching with each type of point are compared, different specimens having been tested under various conditions. It was concluded that the secondary flaws originated by scratching corresponded to those produced by polishing. Other techniques and conclusions reached from these studies of a polishing technique for VHF crystal units, and of the mechanism of quartz deformation from the viewpoint of deformation and residual stress, are described. 68 illustr, 21 ref, 4 tables.

D *Bcb Chm/Bcb Cvb Nc Unk*

Drawings are scribed on glass

Rolls Royce. *Tool & Mfg Engr* 1960 Vol 45 (4) p 92 (Oct)

Markings on emulsion-coated glass are made by a special stylus in a scribing head. Lateral movement of the head upon an arm which can be moved transversely enables the stylus to move in two directions. In addition, the glass can be rotated through any desired angle. Interval plungers and micrometer adjustment ensure accuracy of movement. 1 illustr.

D *Bm Cp Tdb*

New developments in stone sawing

Diamant Boart, Ets Smetcoren, Brussels, Belgium. *Industr Diam Rev* 1960 Vol 20 (237) pp 157-158 (Aug)

The makers collaborated to improve the sawing of stone blocks into thin sections with diamond gang saws and the equipment is reported to remove many disadvantages previously experienced with such devices. The differences between the old and new equipment are described. In the present model the saw frame takes twenty gang saws at intervals of ¾ in., but a model is being designed which will carry thirty or more saws. Sawing rate has been increased by over 100% by reduction in weight and simplified motion, while wear is distributed more evenly. Stone mounting and changing is easier and quicker, and other advantages are listed. 2 illustr. *D* *Bn Cej Ng*

Impairment of strength of quartz glass through wetting by liquids

K. H. Hiller (California Research Corp). *Nature, Lond* 1960 Vol 188 (4745) pp 132-133 (Oct 8)

The rods, selected for a uniform diameter of 1 mm and cut to a length of 10 cm, were annealed to remove residual strains. Three-point bending was used to apply a maximum stress at the centre, where the rods were scratched before they were broken. A diamond cutting tool was applied with a constant force to the underside of each rod to produce scratches of identical depth. Results are given. 5 ref, 2 tables.

D *Bmd Cp Nc*

Surface structure in corundum : I, Etching of dislocations

R. Scheuplein, P. Gibbs (Utah Univ). *J Amer ceram Soc* 1960 Vol 43 (9) pp 458-472 (Sep)

Experimental technique is described, all experiments being done with synthetic corundum single crystals grown by the Verneuil process by the Linde Company. Where it was necessary to prepare a flat surface, the crystals were ground on the appropriate face with a 12 mesh diamond impregnated grinding wheel. Further refining was by grinding with an 800 mesh wheel and then lapping to a mirror-smooth finish with an increasingly fine assortment of diamond pastes, *ie* 15, 6, and 1 micron. To minimize the obscuring effect of scratch marks otherwise produced in a polished crystal after etching, the crystals were sometimes heated in a flame for several seconds before etching. Etching is described. It is stated that a plane surface sectioned from the middle of a crystal etched as well as any other equivalent polished surface. Grinding and polishing *per se* did not change average density of etch pits attributed to dislocations. Each polishing with a 1 μ diamond paste removed about 10 to 15 μ of surface. Latent scratch marks produced became more distinct after etching, but pits attributed to dislocations differed significantly from other etched surfaces. Etching after repeated polishings produced new scratches and pits which bore no obvious relation to previous ones. Other observations are recorded. 33 illustr, 23 ref, 3 tables.

D *Bbc Chc Nv/Bbc Chd Kmg/Bbc Ql Ubm*

Some unusual operations in the production of guidance equipment for Hawk missiles

Raytheon Missile Systems Div, Andover, Mass. *Machinery, Lond* 1960 Vol 97 (2499) pp 775-783 (Oct 5)

Gives details of operations on nose cones and gimbal rings, and of tape controlled machining of forged magnesium gimbal blocks. The glass fibre has some longitudinal lobes on the external surface, which are produced by eccentric turning on a battery of eight tracer controlled Axelson 25 × 96 in. lathes. 18 illustr.

D *Bfk Ceq Wpb/Bmz Ceqb Pr*

Diffusion of ultraviolet and visible light by ground surfaces of fused quartz

W. E. Knowles Middleton. *J Opt Soc Amer* 1960 Vol 50 (8) pp 747-749 (Aug)

The surfaces were ground with abrasives having various particle sizes, and the experiments were made with both the ground and the un-ground sides of the sample facing the light. 5 illustr, 4 ref, 1 table.

D *Bcb Chc Rd*

USP 2,924,050 (Sep 24, 1956) **L. H. Barron**

Diamond edged band saw

A thin flat metal strip has a layer of diamond grit embedded in an electro-plated nickel coating on certain portions of one edge and extending around the marginal lengthwise flat surfaces contiguous to that edge. The width of the coating on the flat surfaces is only a small fraction of the width of the strip, so that the uncoated part of the strip is wide enough to be engaged by guides to hold the strip in a band saw machine. The welded joint holding the band together is as thick as the diamond coating so that it does not cause vibrations when passing through the cut produced by the saw. As the sides of the band are also used for cutting, a clean kerf is obtained which does not bind the saw. From an optical glass block, 23 in. diameter and 4½ in. thick, two arcuate pointed segments were sliced from two opposite edges by a saw with an 80 grit diamond coating moving at 1,700 ft/minute. At a rate of ¼ in./min, the total cut of 62 in. was completed in less than three hours. (7 claims, 10 illustr). Ref cited : 10 USP. *J* *Ngz Urc.545*

Swiss P 343,869 (Sep 2, 1955) **G. Barbotte**

Drilling machine for fine stones. Machine pour le perçage de la pierre fine

The usual machine possesses a number of drill spindles all driven together by the same motor. As the drilling of the stones does not progress uniformly, one hole may be finished before others and the drill continues operating in the hole thus increasing its size. Further, as the spindles are rotating at 30,000 rev/min,

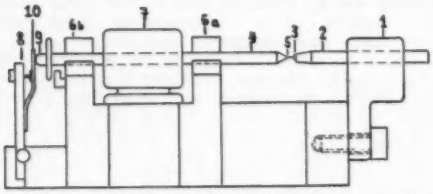


Fig 19. The new machine with individual motors for each drill, showing motor 7 for drill 4. Swiss P 343,869.

vibrations are set up which may break or deform the fine drills of 0.05 to 0.112 mm diameter. The new machine has individual motors for each drill. Fig 19 shows motor 7 for drilling spindle 4. Spring 10 abuts against the end 9 of spindle 4 and contact 8 is interrupted when the spindle with drills 5 has advanced towards stone 3 sufficiently to finish the hole. (2 claims, 2 illustr). *J* *Bb Cfb.545*

FP 1,210,338 (Sep 19, 1958) **Soc d'Optique et de Mécanique de Haute Précision**

Machine for polishing spherical lenses. Machine à polir les lentilles sphériques

The manufacture of lenses comprises three operations : rough grinding with a diamond mixture, polishing to obtain uniform transparency, and cutting concentrically around their optical axis. The machine is designed for the second operation. Its main characteristic feature is a mechanism to impart to the lens holder an alternating clockwise and anti-clockwise rotation while directing jets of fluid around the lenses, using thermostatic control to keep the temperature of the cooling fluid at an optimum. Polishing to the same degree of precision could be done in 8 min while previously designed machines required 25 minutes. A frequency of 150 oscillations/min was used at an amplitude of 90 degrees. The rotation corresponded to an average of 680 rev/min at a pressure of 1.75 kg against 360 rev/min at 0.5 kilogramme. (4 claims, 4 illustr).

J *Bm Chm Tfbb.545*

FP 1,211,447 (July 17, 1958) **P. Michelet, SA Lignes Télégraphiques et Téléphoniques**

Tool set-up for cutting thin plates. Outillage de découpe de plaques minces

The cutting of thin plates of semi-conductor crystals is a difficult mechanical problem. Diamond wheels can only be used for simple geometrical shapes and ultrasonic cutting permits various other forms, but both

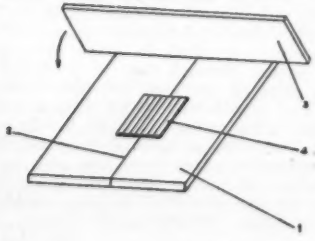


Fig 20. Semi-conductor plate 4 with score lines made by a diamond. FP 1,211,447.

methods require complicated fixing devices and the use of resins which may affect the surface adversely. The arrangement shown in Fig 20 and 21 overcomes these difficulties. On a glass plate 1 is secured a hard metal, *eg* tungsten, molybdenum, wire 2 of *eg* 0.05 mm

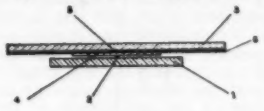


Fig 21. Another view of the set-up. If 5 is positioned over the wire, a cut is made along this line. FP 1,211,447.

diameter. A semi-conductor plate 4 is placed on this wire under a second glass plate 3 with a soft plastic coating 6, *eg* adhesive ribbon. The plate 4 is provided with score lines made by a diamond and if, *eg*, line 5 is exactly positioned and pivoted over the wire a cut is produced along this line. A score line 0.03 to 0.05 mm deep suffices to cut a plate of silicon of 0.4 to 0.5 mm thick. (1 claim, 2 illustr).

J *Az Bde Ceg Pd.545*

GEM POLISHING

Antwerp, 1860-1960, and diamond

Anon. *Diamant* 1960 Vol 4 (24) pp 21-23 (Sep) (In English)

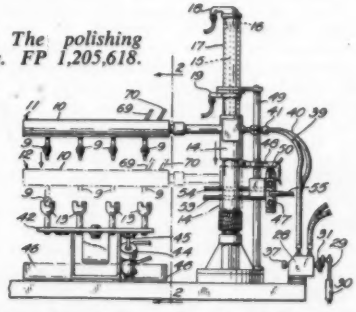
An exhibition from 14th Oct to 15th Nov, 1960, devoted to Antwerp in all its aspects, covered the history of diamond trading and diamond cutting in the city. *D* *F Hl.27.324/F.251.27.324*

FP 1,205,618 **De Beers Consolidated Mines Ltd** (Apr 30, 1957—conv date, South Africa)

Method and apparatus for polishing crystalline carbon. Procédé et appareil pour le polissage de carbone cristallin

Oxygen attacks diamond surfaces at temperatures above 600° centigrade. The attack produces roughness. However, under certain conditions, the method can be used to cause the disappearance of small projections on the surface of the diamond and thus to produce a polished face. Such conditions can be created by treating the diamond in an oxy-acetylene flame in

Fig 22. The polishing apparatus. FP 1,205,618.



which there is an excess of acetylene during the first period of heating up, while afterwards there is an excess of oxygen so as to effect oxidation. Fig 22 shows the arrangement of a polishing apparatus with a battery of oxy-acetylene burners 9 to which gas is admitted through pipe 10 to be lowered automatically into the dash-dotted position by compressed air in cylinder 17. The diamonds are placed in holders 13 and, after treatment, are tipped into bath 46. (21 claims, 8 illustr).

J *F Hp.545*

Swiss P 343,829 (Mar 1, 1956) **W. Staehli**
Machine for faceting series of gems. Maschine zum serienweisen Facettieren von Edelsteinen

The machine is seen from the side and partly in section in Fig 23, and from above in Fig 24. Fig 25 shows details of the individual gem holder. The stones are held in dops on holder-blocks H over scaife 13. The holder-blocks are exchangeably mounted in carrier T on shaft 33 slidable in projecting arm 3. The gem holders are angularly adjustable and the gems E, in Fig 25, are indexed in groups by dividing heads at the outer ends of the holder blocks. Adjustable stops limit the angular movements of the holders. (21 claims, 10 illustr). *J* *Bbb Chc.545*

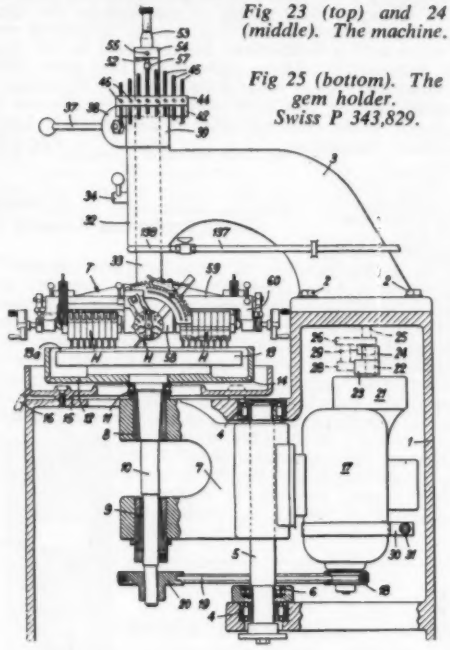
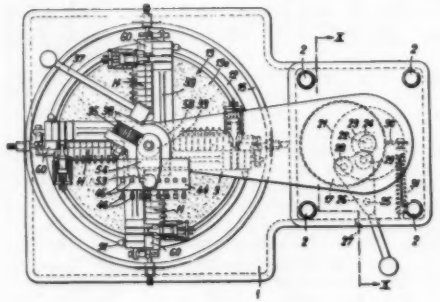


Fig 23 (top) and 24 (middle). The machine.



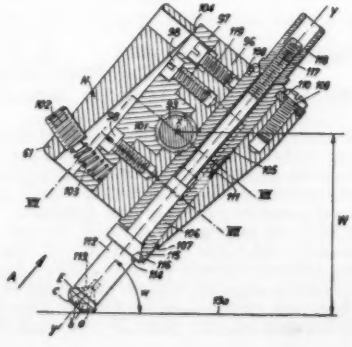


Fig 25 (bottom). The gem holder. Swiss P 343,829.

ROCK DRILLING

Diamond impregnated core bits
Anon. *Min J* 1960 Vol 255 (6520) p 152 (Aug 5)

The main difference between surface set and impregnated diamond core bits is outlined. In the former, the whole cutting and working capacity is located near the surface and re-setting is necessary as soon as the exposed diamonds have lost their cutting power. Also, the diamonds used in surface set bits may vary greatly in quality. Impregnated bits, however, only expose a small part of their cutting elements, the diamond grains being protected by the metal bond. Normally gradual wearing down of the diamonds goes on until consumption of the impregnated part is completed. The quality of the diamonds is unvaried, the Congo boart used having been carefully selected to obtain small but regular crystals, of different grit sizes. The various types of diamond impregnated core bits are described and the role of diamond boart in the development of tungsten carbide inserts, which are impregnated with diamond particles and specially used for drilling in highly abrasive zones and weathered formations, is mentioned. *D* *Nhe*Nqg*

Diamond drilling beneath a city
Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (5) p 2 (July)

Diamond drilling beneath central Broken Hill has reached 4,700 ft, but ultimate depth will be well below this. Two Mindrill B-5,000 drills are in use, drilling holes at angles of 82° and 72° respectively. 1 illustr. *D* *Cfb Nh*

The 1960 Convention of the American Mining Congress
Anon. *Min J* 1960 Vol 255 (6532) pp 470-472 (Oct 28)

Summarizes briefly a few of the papers and includes a section on underground mining. Block caving may become more common, especially in deep-level operations. The importance of regular preventitive maintenance of rock drills was stressed.
D *Bn Cfb Pl.138/Cb.231*

Mindrill F 65
Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (5) p 8 (July)

Describes design features of this diamond drill for medium depth exploration work. 1 illustr.
D *Nh.12*

Thread connections in long hole drilling
Anon. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3521) pp 243, 245, 247 (July 29)
2 illustr. *D* *Az Cfb*

Modern Swedish drilling methods
E. I. Janelid. *J R Sch Min* 1960 (9) pp 5-14 ; *IMM Abstr* 1960 Vol 10 (6) p 202 (Aug-Sep)
D *Cfb.1456.329*

On the penetration rate of a diamond core bit

K. Sasaki *et al. J Min Inst Japan* 1960 Vol 76 (2) pp 75-82; *IMM Abstr* 1960 Vol 10 (6) pp 203-204 (Aug-Sep) (Original in Japanese)

Full instrumentation is made on a medium size boring machine to speed up the experiments and to get more precise data Penetration rate, torque, thrust and pressure of water supply can be recorded automatically on a 4-channel pen writing oscillograph. All results are of laboratory studies on rock specimens ranging from hard to soft formations. Diamond bit used is a surface setting core bit, 46 mm in size, having 12 ct setting. Rotation speed and volume of water supply are variable parameters. Main results obtained from these experiments are as follows: (*i*) penetration rate is almost proportional to thrust and rotation speed of bit; (*ii*) relation between thrust and torque is almost constant for all rocks and this relation does not change with rotation speed; (*iii*) maximum penetration rate is proportional to volume of water supply in the case of constant rotation speed; (*iv*) maximum penetration rate is proportional to square root of rotation speed and the maximum thrust corresponding to maximum penetration rate is inversely proportional to square root of rotation speed; (*v*) penetration rate and maximum thrust for each rock can be presumed from the Shore hardness, indentation depth and compressive strength of the rock.

See also *Industr Diam Abstr* 1960 Vol 17 p A219 (Sep). *X* *Nhe Uqe.21*

Through earth's crust

Anon. *The Times* 1960 (Sep 2)

Speaking about the Mohole project, Dr. T. F. Gaskell stated that probing through the earth's crust was now a practical matter of applied effort and finance. Improved diamond bits combined with the high speed of rotation of the turbo-drill and a rapid hydraulic pipe-pulling mechanism could together achieve the required penetration of the earth's crust.

D *Bnt Cfbf Nhb/Bnt Cfbr Nhb*

The 'hand-over-hand' oil-drilling rig

Anon. *New Scientist* 1960 Vol 8 (205) p 1044 (Oct 20)

A completely hydraulic rig, invented by H. Fanshawe and backed by the National Research Development Corporation, features a revolutionary system of pulling out the drill pipe from the borehole. It is suggested here that the Mohole project may necessitate some such automatic system because of the time it would take to pull seven miles of pipe by conventional methods. *D* *Cfb Prx Psc*

Drill-rig combine speeds sinking

Shaft Drilling Services (Pty) Ltd. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3526) pp 563, 565 (Sep 2)

The development of a drill rig used in shaft sinking on the Ruhr is discussed. This combination of percussive rotary drills and a collapsible drilling jumbo is said to have cut considerably both drilling time and number of workers needed. The Percussive Rotary Drilling system involves positive feeding under heavy thrust, forced rotation to produce a shearing effect, and percussive blows of twice the frequency known in conventional drilling. The system is thus regarded as a hybrid between percussion and rotary drilling. The detachable tungsten carbide tipped bits are made with two separate inserts and the cutting angle of 80° is steeper on the luff than on the lee side. Research is said to have indicated that the system can produce surprising rates of penetration, particularly in formations of medium hardness such as kimberlite. 2 illustr.

D *Cfbf Pr.132/Cfbr Pr.132*

Gyroscopic borehole survey instrument

Rio Tinto Mining Group, South Africa. *S Afr Min Engng J* 1960 Vol 71 Pt 2 (3527) p 611 (Sep 9)

A borehole survey instrument using a small gyroscopic compass is designed, at present, for a maximum vertical depth of 3,500 ft, being lowered on a special cable through which power is supplied to the gyroscope and multi-shot recording camera. It may be used in holes having inclinations from vertical to 30° from the horizontal. After corrections for gyro drift, accuracy of ±1° is said to be attained. Operation is simple, and as the gyro compass is unaffected by magnetic fields, readings may be taken inside highly magnetic formations. *D* *Az Qd Wc*

USP 2,915,284 (Jan 14, 1955) **J. E. Ortloff, Jersey Production Research Co**

Reservoir coring

It is hardly possible to obtain reliable samples of petroliferous formations for secondary recovery procedure when using conventional drilling and coring methods, even by driving entirely new holes, because of the presence of drilling fluid. Contamination of a sample is avoided by cutting the core sample within the coring barrel and closing the point of entrance so as to entrap the sample and its connate fluids within the barrel. Conventional drilling means may be employed, but preferably in conjunction with air or any other gasiform material as the drilling fluid. Fig 26 is a cross section through a rotary coring bit in which the sealing ram 13 is normally retained in chamber 19 but thrust into sealing position by energizing coil 35. 31 is a resilient material to provide a fluid-tight seal. Suitable gasiform drilling fluids include chemical inert gases or those non-reactive with the core sample. (13 claims, 7 illustr). Ref cited: 7 USP.

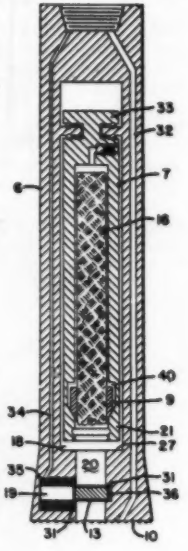


Fig 26. Cross section of a coring bit showing sealing ram 13, chamber 19, and energizing coil 35. USP 2,915,284.

J *Plbz.545*

USP 2,916,951 (Jan 28, 1957) **E. A. Carlson, C. J. Pryor, Olofson Corp**

Hydraulic mechanism for retracting diamond boring tool

The characteristic feature of the mechanism is the use of the resiliency of standard alloy steel bolts to permit slight rocking movement of bolted parts relatively to one another under sufficient pressure. Fig 27 shows the general arrangement of the boring apparatus, partly in section, with the boring bar 52, quill 30, and diamond or carbide bit 54. The problem of retracting tip 56 from the inferior surface 0.001 in., which is sufficient for withdrawing the tool without damaging the surface of the bore, has been solved by the insertion of retract plate 28 between adapter plate 26 and quill flange 40.

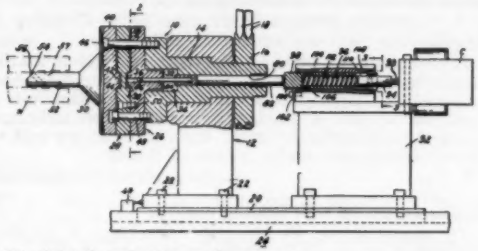
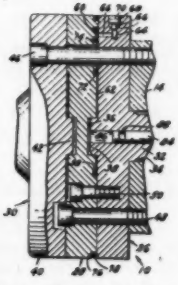


Fig 27 (above) . General arrangement of the apparatus.
Fig 28 (right). A clearer view of the retract plate with circular chamber 62. USP 2,916,951.



This retract plate has a flat excentric circular chamber 62, shown more clearly in Fig 28, to which pressure fluid is admitted through an electrically controlled valve system which also controls the hydraulic table movement. The resultant eccentric pressure of the order of 200 p.s.i. on retract plate 28 causes a slight tilting movement, while bolts 46 resiliently yield to permit a minute retraction of tip 56. (12 claims, 7 illustr). Ref cited : 4 USP. *J* *Cfd Nf.545*

WIRE DRAWING

Diamond belts cut die-polishing costs

Chase Brass & Copper. *Amer Mach* 1960 Vol 104 (16) pp 74-75 (Aug 8)

Hand polishing of large carbide drawing dies used to take from 2 to 6 h but polishing can be done in as little as 15 min by a diamond belt method, while overall costs are claimed to have been cut by a ratio of 50 : 1. Dies of sizes from ¼ to 8 in. diameter can be serviced by belts ranging from 3/16 to ½ in. in various grit sizes. Belts are impregnated with 100, 200, or 300 mesh natural diamond grits and are water cooled. Average life has not been determined because of the difference in amount of carbide removed at each job, but up to 200 dies have been serviced by one belt. 1 illustr. *D* *Ax Chm Nvg*

Dies made from Yakutian diamonds for the drawing of fine wire

G. P. Gvozdyk. *Stal* 1960 (7) pp 528-529 (July) (In English, original in Russian)

Data on the workability of Yakutian diamonds and on the durability of dies made from them for drawing fine wire are compared with data on stones imported into Russia for this purpose. Tables show weight losses during manufacture and time taken to make one diamond die. It was concluded that losses were smaller when manufacturing dies from Yakutian stones than from imported diamonds, *ie* 25.2% instead of 35%, and this is said to be explained by the better geometrical shape of the former. It is also stated that life of dies made from Yakutian diamonds is 3.3% higher than life of dies made from imported diamonds. 2 tables. *D* *Eb Fc.332/F Hq Nkb*

Review on the International Machine Tool Exhibition, Olympia, London

Anon. *Wire World Internat* 1960 Vol 2 (4) pp 186-190 (Aug)

The 'BEER' Drawing Die Grinding and Polishing Machine uses an endless abrasive band guided through the die aperture by means of guide rollers, which are adjustable both vertically and horizontally so as to allow the abrasive band to follow the curve of the die. The machine, designed to operate in the direction of the draw, can be used for grinding, lapping, or polishing hardened steel and tungsten carbide dies with inner diameter of 5/16 to 12 in. and outer diameter up to 19 inches. The Thiel diamond filing machine for filing and lapping tungsten carbide dies is also described. *D* *Ax Bkcb Chd Nv Pr.27/Ax Bkcb Cz Nqc Pr.27/Ax Chc Pee Pr.27*

GRINDING AND POLISHING OF CARBIDES AND METALS

The fabrication of boron by powder metallurgical techniques

P. Best, S. R. Twigg. *Metallurgia* 1960 Vol 62 (372) pp 146-152 (Oct)

Because boron is 9-10 on the Mohs' scale, and because of the brittleness of the compacts, conventional machining of compacts was not considered. Spark erosion, ultrasonic and diamond grinding were investigated, a tolerance limit of ±0.002 in. being set for all surfaces. Results are given. Diamond grinding produced a finish well within the required tolerance and over 100 compacts were ground without a failure that could be attributed to grinding. Working technique is outlined. A diamond impregnated 8 in. diameter wheel, ¼ in. wide, was run at 1,675 rev/min using 0.0008 in. cuts. Neither of the other two methods proved satisfactory. 11 illustr, 3 tables. *D* *Bz Ch Nv Qt*

Secrets of carbide die finishing

W. B. Panko (Engis Equipment Co). *Grinding & Finishing* 1960 Vol 6 (7) pp 33-35 (July)

Diamond compounds play an important part in the successful operation of modern techniques of cold extrusion. It has been found that these are the only abrasives, tried at Verson Allsteel Press Co Research and Development Center, that will cut carbides properly for extrusion tools. Diamond compounds provide a clean cut with no burnishing, while, when used on steel, they cut faster and give a superior finish. Results achieved with various grades of Hyprez diamond compound in sequence are described. 8 illustr. *D* *Ax Bk Chm Kmg*

Automatic loader for grinding machines. Caricatori automatici per rettificatrici

P. L. Levi. *Macchine* 1960 Vol 15 (8) pp 713-722 (Aug) (In Italian)

27 illustr. *M* *Chc Pr Psc*

Metallographic polishing of very hard materials

L. E. Samuels. *J Aust Inst Metals* 1960 Vol 5 (1) pp 63-67 (May); *Bull Brit non-ferr Met Res Ass* 1960 Vol 40 (375) p 515 (Oct)

Diamond impregnated plastic laps are used for preparation of sintered carbides, followed by diamond polishing on cloths. Details of manufacture are given. *D* *Bkc Chm Nv/Bkc Chm Nvg*

Nose cones . . . a study in grinding technique

D. Ward, M. E. Passmore. *Industr Diam Rev* 1960 Vol 20 (237) pp 146-149 (Aug)

6 illustr.

See *Industr Diam Abstr* 1960 Vol 17 p A196 (Aug).

D *Az Chc.1456*

Diamond wheel test program pays off

Ford Motor Co, Indianapolis, Ind. *Tool & Mfg Engr* 1960 Vol 45 (4) pp 83-84 (Oct)

Diamond wheel usage has been cut by 60% in tool grinding operations: new control methods combined with use of Engelhard SND-RB-Needle grit for resin bonded wheels contributed to this improvement. Principal diamond grinding operations are the re-sharpening of many types of sintered carbide tools and cutters. Cincinnati No 2 and Oliver machines are used for nearly all dry grinding jobs, infeeds generally being from 0.0005 to 0.001 inch. Brown & Sharpe No 13 grinders are used for wet grinding at infeeds up to 0.0005 inch. Wheel testing is described, including a diamond wheel evaluation test. On the basis of these tests, SND-RB grit has been specified for all resin bonded diamond wheels. 2 illustr.

D *Kl Nv Urb/Nv.1341*

Electropolishing of columbium and tantalum

O. J. Krudtaa, K. Stokland. *Metal Progr* 1960 Vol 77 (1) pp 101-103 (Jan)

Electro-polishing in a solution containing hydrofluoric acid is said to be the best way of preparing columbium and tantalum specimens for micro-hardness measurements. Mechanical polishing using alumina or diamond paste in alcohol would given an undesirable work hardening effect, it is said. The apparatus used for the tests described was a DISA-Electropol.

L *Bz Chm Km/Bz Chmk*

Wear of nonferrous metals by tungsten carbide

R. F. Hartmann. *Metal Progr* 1960 Vol 78 (1) pp 192-194 (July)

Radio-tracer techniques were used to study the transfer of bonded tungsten carbide to other metals and also the transfer of metal to carbide. Experimental methods included preparation of carbide tips either by polishing with a diamond paste or by polishing followed by etching with alkaline-ferricyanide.

D *Bkcb Chm Kmg*

Revealing lead inclusions in leaded steels

G. M. Chalfant. *Metal Progr* 1960 Vol 78 (3) pp 77-79 (Sep)

A new metallographic procedure permits the lead inclusions in steel to be positively identified with any light microscope. Various stages of the grinding of specimens for examination are described, including final polishing with an aqueous suspension of gamma alumina that is precisely neutral. 3 illustr.

D *Bfd Chc/Bfd Chm Vj*

Works visit [:] Dowty-Rotol Limited

Anon. *Metal Ind, Lond* 1960 Vol 97 (13) pp 262-264 (Sep 23)

Equipment in the metallurgical laboratory includes an up-to-date range of polishing and lapping machines. Diamond paste is used for the final preparation of specimens. In the microscope room, instruments include a Vickers projection microscope with micro-hardness testing equipment. Micro-hardness testing is used fairly widely for measurements of hardness transition from case to core of case-hardened parts and for similar measurements on plated coatings. 4 illustr.

D *Bfa Chm Kmg/Unhcc Wghd/Wcmz*

Proper techniques broaden lapping applications

R. T. Capansky (Weston Hydraulics Ltd). *Grinding & Finishing* 1960 Vol 6 (7) pp 30-32 (July)

Investigation to improve flat lapping falls primarily into two categories: the first is the selection of the best type of flat lapping equipment for the particular job, and the second is the improvement of the technique used in each particular case. Both of these are said to have yielded spectacular results. 5 illustr.

D *Chd.1456.21*

Continuous action tool lapping machine

A. G. Storozhik, A. E. Matyash. *Machines & Tooling* 1960 Vol 31 (5) pp 34-35 (Original in Russian)

4 illustr. *D* *Chd Pr*

An automatic method of ensuring accuracy of dimensions in centreless grinding

S. S. Volosov, G. B. Turbin. *Izmeritel'naya Tekhnika* 1960 (5) p 7 (May); *Sov Sci in Transl* 1960 Vol 4 (5) p 21 (July) (Original in Russian)

D *Chcc Wp.133*

Automatic statistical quality control in centreless grinding. Automatische statistische Qualitaetskontrolle beim spitzenlosen Schleifen

J. Hrabak. *Fertigungstechnik u Betrieb* 1960 Vol 10 (9) pp 509-511 (Sep) (In German)

5 illustr, 2 ref. *A* *Chcc Pr Wp*

Uniform economical grinding tolerances. Einheitliche Wirtschaftliche Schleifzugaben

G. Loeschner. *Fertigungstechnik u Betrieb* 1960 Vol 10 (9) pp 513-515 (Sep) (In German)

1 table, 4 ref. *A* *Chc.252*

Modern machines and methods for external grinding—Pt I. Moderne Maschinen und Arbeitsverfahren fuer das Aussenrundschleifen—Pt I

W. Klemm. *Fertigungstechnik u Betrieb* 1960 Vol 10 (9) pp 515-518 (Sep) (In German)

5 illustr, 10 ref. *A* *Chc Pr/Chc.1456*

Titanium tackles the civilian market

Anon. *Canad Mach & Metalworking* 1960 Vol 71 (7) pp 64-66 (July)

Various methods of machining titanium are discussed. In grinding, coolants have a significant effect on the wheel/metal-removal ratio. 4 illustr.

D *Bfn Ceq/Bfn Chc Sj*

Japanese machine tool factories — 3

R. E. Green. *Machinery, Lond* 1960 Vol 97 (2497) pp 652-661 (Sep 21)

Describes work at the Toyder Machine Works Limited. Precision machining operations briefly discussed include planetary grinding with an air-driven attachment on a jig boring machine, jig boring, and thread grinding. 13 illustr.

D *Ceq.21/Pr.263.373*

Wheel grading by frequency

Anon. *Grinding & Finishing* 1960 Vol 6 (7) p 43 (July)

Requirements for uniformity between abrasive wheels of a specific type are becoming increasingly rigid. In a series of supposedly identical grinding wheels, the natural frequency of vibration of each wheel is said to be a sensitive measure of even minor differences. It seems that identical grinding results could be expected by selecting the replacement wheel on this basis. The Saturn Electronics Co Model 105 Sonic Comparator was used to illustrate the sensitivity of the sonic test. 1 illustr.

D *Pe Qn.2552*

From the notebook of the sintered carbide worker. Aus dem Notizbuch des Hartmetallpraktikers

Anon. *Technica* 1960 Vol 9 (20) pp 1201-1204 (Sep 23) (In German)

Amongst the points discussed is the fine grinding of sintered carbide cutters with silicon carbide grinding wheels. 15 illustr.

A *Al Bk Chc Pe Rgc*

Balancing of grinding wheels

W. R. Backer (Norton Co). *Tool & Mfg Engr* 1960 Vol 45 (4) pp 95-101 (Oct)

While routine work does not require the refinement of wheel balance, vibrations due to lack of balance can affect the accuracy of high precision grinding operations. The causes and effect of the incorrect balance are discussed. 7 illustr.

D *Pe Qq*

How to estimate bandsawing costs

J. Gliebe (National Acme Co). *Tool & Mfg Engr* 1960 Vol 45 (4) pp 114-115 (Oct)

2 illustr. *D* *Cejz.252*

Grinders use in-cycle gaging to make precise bearings

Anon. *Iron Age* 1960 Vol 185 (22) pp 74-75 (June 2)

Automatic gauging used in a new bearing plant enables centreless grinders to meet tolerances as close as 0.000028 in. Hundreds of individual gauging operations help to check each spherical roller bearing that is produced. Over-grinding of all parts is prevented by centreless grinding with automatic in-cycle gauging. 1 illustr. *L* *Chcc Pr Wbb*

Czechoslovakia's largest machine tool plant . . . TOS Kurim

P. Trippe. *Metalworking Prod* 1960 Vol 104 (36) pp 67-69 (Sep 7)

Production highlights include deep core drilling of spindles with carbide tipped drills: the elimination of lapping in many operations by machine honing, and grinding of friction surfaces with 'Mikropolid' bakelite bonded wheels. Considerable research has been carried out on the machining of guideways. 9 illustr.

D *Pr.2635.326*

Throw-away inserts with carbide elements offer new concept of economy

D. G. Jones. *Metal Progr* 1960 Vol 77 (5) pp 108-110 (May)

The article stresses the economy of throw-away carbide inserts and mentions how they can eliminate diamond wheel re-grinding with its inherent control problems.

See also *Industr Diam Abstr* 1960 Vol 17 p A70 (Mar).

E *Nv*Pdcb*

Matrix 1A-8-24 cylindrical grinder

Anon. *Metalworking Prod* 1960 Vol 104 (36) pp 95, 97 (Sep 7)

Now available with a self-contained motorized workhead for live and dead centre work, the Matrix 1A-8-24 precision cylindrical grinding machine for toolroom and high-grade production work has a maximum capacity between centres of 24 in. with a maximum swing over the table of 8¼ inches. The tailstock casting houses a spring-loaded barrel provided with adjustment for centre pressure. The dressing diamond holder is mounted above the centre, enabling the wheel to be dressed without disturbing the workpiece. Other features are described. 1 illustr.

D *Chcl Pr:Nj Psf*

Gardner Machine Company

Gardner Machine Co, Beloit, Wisc. *Grinding & Finishing* 1960 Vol 6 (9) p 26 (Sep)

Among seven new precision disk grinders produced by the company is the 2H10 precision double horizontal spindle disk grinder, which is automatic except for disk dressing. It is said to grind opposing faces of small parts such as instrument bearing races parallel to 0.000025 in. at a rate of 5,000 to 6,000/hour. Stock removal rate is 0.006 in. to 0.008 inch. Another such machine is the completely automated Model 2H30 double horizontal spindle disk grinder which loads and indexes universal joint spiders, grinds each pair of trunnion ends flat and parallel, and automatically keeps abrasive disks dressed and advanced to compensate for wear. The machine is claimed to grind 2,400 complete spiders parallel to tolerances of 0.0001 in. to 0.0002 in. with stock removal of 0.015 inch over-all. 1 illustr.

D *Az Chc Pr*

Jones & Lamson Machine Co

Jones & Lamson Machine Co, 522 Clinton St, Springfield, Vermont. *Grinding & Finishing* 1960 Vol 6 (9) p 27 (Sep)

New automatic form grinders feature Perpetual Form Control (PFC), with cemented diamond cutters (CDP), and are claimed to have the advantages of high production, close tolerance grinding with no time loss for wheel dressing. Model E-3 with a PFC dresser has up to 12 in. of width for CDP cutters.

D *Nq:Chcb Prs*

Jones & Lamson Machine Co

Anon. *Machinery, Lond* 1960 Vol 97 (2495) pp 545-546 (Sep 7)

A type F thread grinder, designed for high production of small parts such as taps, and a precision thread and form grinding machine originally developed for the electronics industry are described. Automatic form grinders are equipped with diamond impregnated wheel dressers which operate without interrupting the grinding cycle. 1 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A280 (Nov).

E *Chcb Prs:Nje Psf.27/Chcp Pr.27*

Machines 1960 . . . Machines 1960

Anon. *Mach Mod* 1960 Vol 54 (617) pp 69-72, 75-101, 103 (Aug) (In French)

Exhibits at recent machine tool shows are reviewed. The Société des Forges et Ateliers du Creusot universal plane grinding machine, type RUP Y4, is made in three sizes and has a tilting head that permits work under all angles. The grinding wheel is diamond impregnated. The Mecavia Model RM 12M internal grinder for the machining of cones is described. Cha et Sady Model 54-4 surface grinder has automatic convevance from the work table and automatic down-stroke of the grinding wheel; Model 54-3 of the same series has manual control which can be made automatic and allows for choice between cup wheel, segmented wheel, or both for alternating use. Various models and sizes of Buchel machines for lapping cylindrical holes, all fully automatic, employ oil hydraulic convevance. Many other grinding machines of interest are described.

A *Chc Nv Pr.27/Chc Pr.27*

Machine Tool Exhibition, Hanover, 1960 — Grinding machines. Werkzeugmaschinen-Ausstellung, Hannover 1960 — Schleifmaschinen

K. Schroedter. *Werkst u Betr* 1960 Vol 93 (9) pp 546-555 (Sep) (In German)

29 illustr. *A* *Chc Pr.27.322*

Preview of the Machine Tool Exhibition in Hanover. Vorschau auf die Werkzeugmaschinen-Austellung in Hannover

Anon. *Maschininwelt u Elektrotechnik* 1960 Vol 15 (8) pp 294-314 (Aug) (In German)

A number of grinding machines are reviewed. The Tschudin high precision hydraulic circular grinding machine is constructed to permit interchangeability of all parts. Table speed is infinitely variable up to 5 m/min, and the workpiece spindle can be turned through 360 degrees. The rotary attachment surface grinding machine. Hoerster model KMS, is built in three sizes, 400, 600, and 800 mm, and can grind knives and circular and hollow saw blades. Hydraulic transmission permits infinite adjustability from 0 to 140 rev/minute. The Myford high precision grinder is a simple machine with hand-feed for the table and grinding wheelhead. A number of other accessories permit its use for series production as well as tool-making.

Models MC-35 and MC-50 Holmquist centreless circular grinders are equipped with truing devices having interchangeable contour guides for polishing and control wheels. The Kirner automatic special grinding machine is for systematic production of rotating cutting parts from hard metal of all kinds and shapes. Thielenhaus micro-finish machines for the working of both round or spherical and plane surfaces are claimed to achieve a very high standard of finish on the surfaces. The special Fortuna thread grinding machine described grinds automatically the bearings of 4 cylinder crank revolutions in only one operation with a single shaped grinding disk. 42 illustrations.

A *Chc Pr.27*

Shoulder grinding to fine limits

F. Studer Ltd, Glockenthal-Thun; Movomatic Ltd, Neuchatel. *Mech Engng, NY* 1960 Vol 82 (10) pp 84-85 (Oct)

Two firms have collaborated in the design of a machine for the accurate production of shoulder distances on a quantity basis, without reference to a second dimension. Shoulder distances up to 4.7 in. within an accuracy of 0.001 mm are said to be possible. Types of work for which the machine is intended include manufacture of high-precision valves, and the production of a controlled matching or over-lapping between shoulders on the valve and ports in the valve sleeve for such applications as the hydraulic operation of machine tools. *D* *Chcz Pr*

Matchless Machines Ltd

Anon. *Mach Shop Mag* 1960 Vol 21 (8) pp 511-513 (Aug)

Describes a new development in which Movomatic Deltalimit gauging equipment, used on a Studer grinding machine, enables the shoulders on spool valves to be ground to suit the pitch of the ports in the sleeve in which the spool is to be fitted. 6 illustr.

D *Chc Pr Wbb.27*

Belt grinding machines. Bandschleifmaschinen

W. & R. Knopp. *Die Maschine* 1960 Vol 14 (9) pp 62-63 (Sep)

A belt grinding machine described here can be used for precision grinding of small or large workpieces up to 300 mm in length. A surface support helps surface working, maximum 100 × 700 mm; any desired angle may be ground with the angle support with inclination up to 45 degrees. For the machining of shaped parts a rubber contact platen takes the place of the steel support. Machines with special attachments are made for grinding glass. 1 illustr.

A *Chcw Pee Pr*

First automatic setup for auto-crankshaft grinding

Landis Tool Co, Waynesboro, Pa. *Amer Mach* 1960 Vol 104 (17) p 268 (Aug 22); *Machinery, Lond* 1960 Vol 97 (2495) pp 539-541 (Sep 7)

An automatic set-up for crankshaft grinding produces all line bearings on a 10 in. IWR multiple-wheel grinder and all throw bearings on a new pin grinder. Automatic conveying equipment between the machines is provided. The crankpin grinder has a Truform dresser with rotating diamond dressing wheel controlled from a profile bar. 1 illustr.

D *Agn Chc Pr:Nj Psf.27*

Leland-Gifford grinder produces drill points, 0.0135-0.250 in.

Leland-Gifford Co, Worcester 1, Mass. *Amer Mach* 1960 Vol 104 (17) pp 265-266 (Aug 22)

The Drill Point Master will produce or reproduce a drill point of any specified geometry on drills from 0.0135 to 0.250 inch. The machine has precision adjustments for locating the drill with reference to the grinding wheel, indexing the drill 180°, and obtaining any desired point angle from 60-180°, with any relief angle from zero to 26 degrees. The grinder, with completely enclosed electrical controls, has a sandwich wheel especially developed for clean, dry grinding and accurate point thinning without burning.

D *Alb Chc Pr*

Production deburring of bearing races

Wickman Ltd, Coventry. *Metalworking Prod* 1960 Vol 104 (38) p 82 (Sep 21)

Costs have been reduced by changing to automatic production deburring from hand filing. An air-operated Pines model 660 end finishing machine has a single tool which removes burrs without removing stock from the id of bearing races. Life of grinding wheels used subsequently is said to be increased. The deburring machine operates between two bore grinders and all three can be worked by one operator. 1 illustr.

D *Ay Chm Pr*

Interlinkable broaching machines. Verkettbare Raeummaschinen

K. Hoffmann. *Werkst u Betr* 1960 Vol 93 (10) pp 641-642 (Oct) (In German)

Using the example of a gear wheel which has to be broached consecutively internally and externally, the author demonstrates some possible applications of attachments which enable interlinkage of broaching machines with each other and with other cutting machines. 6 illustr. *A* *Cfm Pr Psc*

Tool, cutter grinder

S & S Machinery Co, 140 53rd St, Brooklyn 32, NY. *Tool & Mfg Engr* 1960 Vol 45 (4) p 156 (Oct)

Model AUL 500 has a patented grinding wheel head which is said to be extremely versatile. The machine handles any type of reamer, tap, gear cutter, *etc*, and can also be used as a standard cylindrical, internal, tangential, and surface grinder. The 25 accessories available fit the machine for any tool grinding problem, it is claimed. 1 illustr. *D* *Chc Pr*

Norton Co

Norton Co, Worcester, Mass. *Machinery, Lond* 1960 Vol 97 (2495) pp 541-542 (Sep 7)

The No 200 cutter and tool grinder has a rail beneath the centre which assures accurate guidance when the table is traversed, and a two-speed spindle drive which enables the diamond wheels to be run at the correct speeds. 1 illustr. *E* *A Chc Nv Pr.27*

Microhoning helps Hawk Missile to ' think ' straight
Raytheon Co. *Cross-Hatch* 1960 Vol 12 (2) pp 2-4 (July-Aug)

Microhoning is used in the processing of valve sleeves and blocks in the servo-mechanism that guides the Hawk Missile. Thirteen different sized components are microhoned to correct the camber, or bow, in the bore, and to minimize the smear around the ports. Rough and finish microhoning are described. Final finish and fit are done by lapping. Tolerances of 0.00005 in. must be held for roundness and straightness. 5 illustr.
D *Chhc.1456*

Resin diamond wheel offers cool dry grinding
A.I.T. Diamond Tool Co, 8221 North Kimball Ave, Skokie, Ill. *Grinding & Finishing* 1960 Vol 6 (10) p 59 (Oct)

The Forty-Niner resin bonded wheel is said to offer finer finishes due to its cool grinding under dry conditions. The wheel is also claimed to excel in either wet or dry grinding, while having longer life and a body that resists expansion. Wheels come in 50, 75, or 100 concentration, in grit sizes specified by the user.
D *Nv Urb*

Grinding wheel balancer
Fortuna Werke AG, Stuttgart-Bad Cannstatt, Germany. *Mach Lloyd* 1960 Vol 32 (18A) p 35 (Sep 3)

This device is designed for fitting to the Fortuna-Werke range of cylindrical grinding machines. Known as the Finibalanz, it is largely incorporated in the grinding spindle and enables balancing of the grinding wheel without removing it from the machine. The unit consists of an electronic measuring and indicating arrangement and a mechanical device for providing out-of-balance compensation. 1 illustr.
D *Chcl Pe Psc Qq*

Elb-Schliff — Edmund Lang, Babenhausen/Hessen
Anon. *Werkstattstechnik* 1960 Vol 50 (9) p VI (Sep) (In German)

Flat and special grinding machines are equipped with a particularly large automatic cross-feed and the work is sized automatically during the grinding process so that waste is said to be eliminated almost entirely. 3 illustr.
A *Chc Pr Psc.133*

Automatic grinding machine
Robert Habib & Cie, 8 Rue de la Rotisserie, Geneva. *Mach Lloyd* 1960 Vol 32 (18A) p 29 (Sep 3)

The wheelhead of this automatic hydraulically operated machine for grinding cutter heads can be swivelled in all directions and the indexing head can be pivoted through 180 degrees. The unit is suitable for grinding form cutters, reamers, indexing plates, grooved arbors, *etc*, and an extension piece to the wheelhead makes it is possible to grind two-edged cutters. All types of grinding wheels can be mounted on the wheelhead and the machine can work dry, with a dust exhaust inside the body of the machine, or wet, with a coolant supply inside the body. 1 illustr.
D *Al Chc Prs*

Double-sided internal grinding machine. Doppelseitige Innenschleifmaschine
Maschinenfabrik Spandau, Berlin-Spandau. *Industrie-kurier* 1960 Vol 13 (149) p 570 (Sep 28) (In German)

The machine grinds cylindrical borings simultaneously with identical spindles arranged at both ends of the workpiece. Machine control is indirect. For small holes of less than 18 mm diameter, the use of high frequency grinding spindles is recommended. 1 illustr.
A *Chcn Pr*

Pneumatic grinder weighs 15 oz, develops 50,000 rpm
M-B Products Inc, 46 Victor Ave, Detroit 3, Mich. *Grinding & Finishing* 1960 Vol 6 (10) p 58 (Oct)

The Model 60 Cyclone pneumatic grinder, 6½ in. long and weighing only 15 oz, is said to operate best at 50,000 rev/min with mounted grinding wheels. The spindle accommodates mandrels ¼ in. in diameter. 1 illustr.
D *Chc Prz*

Vibratory polisher
Fisher Scientific Co, 389 Fisher Bldg, Pittsburgh 19, Pa. *Purchasing Week* 1960 Vol 3 (38) p 41 (Sep 19)

An automatic vibratory machine can polish twenty samples of different metals simultaneously. A transparent plastic shield is provided to guard against dirt. 1 illustr.
D *Bf Chm Pr Qn*

BP 829,364 (Feb 13, 1957) **G. Malugani, E. Whitten, H. M. Hobson Ltd**

Grinding machines

Accurate positioning of the crusher for forming a profiled grinding wheel is important but difficult to achieve even if manual positioning is replaced by automatic means. The difficulties have been overcome by arranging the movements of the wheel slide and of the workpiece or crusher slide, so that wheel and workpiece rotate in the same direction at different peripheral speeds about parallel axes normal to the direction of the relative movement. The movement takes place in tangential direction, the wheel passing the workpiece to a pre-set depth. Wheel 12 in Fig 29 is driven by motor 13, and workpiece 17 or the crusher roller by motor 18.

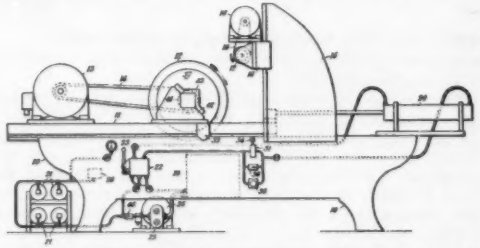


Fig 29. Diagram of the arrangement showing wheel 12 driven by motor 13, and workpiece 17 by motor 18. BP 829,364.

An hydraulic mechanism moves slide 11 to the right, at first rapidly, until cam 33 contacts plunger 34 closing valve 31 to restrict the oil flow and to slow down slide 11 to grinding feed. Feed and speed adjustment are made when the workpiece is replaced by a profiled crush roller. (10 claims, 4 illustr).
J *Chch Pr:Abm Cgj Psf.545*

MACHINING DEVELOPMENTS

Electrical properties of alloyed p-n junctions in silicon carbide
T. E. Kharlamova, G. F. Kholuyanov. *Sov Phys, Solid State* 1960 Vol 2 (3) pp 397-402 (Sep) (Original in Russian)

Specimens were cut ultrasonically using boron carbide as abrasive. Plane-parallel plates, 0.2 to 0.3 mm in thickness, were obtained by polishing with a silicon carbide powder on a steel disk. 6 illustr, 14 ref.
D *Bkz Ceqr Rgb/Bkz Chm Rgc*

One machine replaces three at Dodge

L. Ransberger. *Carbide Engng* 1960 Vol 12 (8) pp 17-18 (Aug)

Electrolytic grinding is said to reduce costs of wheels, labour, burden, and scrap involved in grinding tungsten carbide tools and cutters. The Hammond SCE-6 Electrolytic Tool Grinder performs all the work that was previously done on one surface grinder and two cutter grinders, removing metal by electric flow. Grinding time, as well as expenditure for consumable diamond wheels, is reduced. The first diamond wheel, 6 in. diameter, ¼ in. rim width, 1/16th in. depth, lasted from March to December, the second was used up to the following October, and the third was still in use the following August. As the process generates very little heat, heat cracking of tools is eliminated. 2 illustr.

L *Chcr Nv Pr*

Hot machining

W. Pentland *et al. Amer Mach* 1960 Vol 104 (14) pp 117-132 (July 11)

Hot machining is an attempt to soften the work by heating it, thus making it easier to cut and consequently lengthening tool life. This article describes research into hot machining of the new super alloys. 27 illustr.

D *Bfx Ceq Vbb*

Electroforming a liner for Mach-6 wind tunnel

G. E. Sutila. *Metal Progr* 1960 Vol 77 (3) pp 76-79 (Mar)

The electro-forming process allowed the machining of the nickel liner to be external where the contour could more easily be generated and checked. Rough and precision machining operations are described. 4 illustr.

L *Bfl Ceq*

Grinder has 3000 ampere electrolytic power unit

Thompson Grinder Co, Springfield, Ohio. *Steel* 1960 Vol 147 (9) p 185 (Aug 29)

The grinder may be used for grinding by electrolytic or conventional methods. It has an 18 in. diameter, 2½ in. wide, non-diamond metal bonded grinding wheel which may be used for serration grinding on the periphery, or the side of the wheel may be used for face grinding. A diamond dressing shoe forms 16 pitch, 90° serrations in the periphery of the wheel. A metal bonded diamond wheel is used for grinding carbides or carbide and steel combinations. The unit can handle grinding wheels from 10 × 5 × 2 in. to 20 × 8 × 4 inches.

L *Chcr Pr:Nj Psf/Bk Chc Nv Pr*

BP 827,267 **Ateliers des Charmilles SA**
(Feb 20, 1957—conv date, Switzerland)

Electrodes and devices for securing them in an electro-erosion machine

The shape of the electrode is altered during spark machining by the sparks removing material not only from the workpiece but also from the electrode. Detaching the electrode for restoration or exchange and then replacing it in exactly the same position as before is difficult because the electrode is generally of a soft metal, *ie* copper, and deformation cannot be avoided. Therefore the electrode is composed of a shaped soft portion rigidly fixed to a part of ferro-magnetic material to be applied to a holder by magnetization, *eg* by creating a magnetic field. Holder and ferro-magnetic part are provided with locating means so that the electrode is always replaced in exactly the same position. (5 claims, 5 illustr).

J *Ceqn Pr Ptc.545*

LITERATURE REQUESTS
Please quote the page number of the Bibliography containing the original reference, and the author and title of the article, in all cases.

BP 830,142 **Cavitron Corp**
(Mar 8, 1955—conv date, USA)

Sonic and ultrasonic cutting tools

Sonic or ultrasonic cutting has been effected hitherto by a tool having an end shaped like the desired hole; the tool was oscillated at a very high frequency, though of low amplitude, in the direction of the cut as explained in BP 602,801. This process is modified by designing the tool tip so that the hole is not made only by pressing it in the direction of the longitudinally-vibrated axis of the tool, but also by pressing one or more selected sides against the side wall of a previously opened hole, *eg* for enlargement while a liquid suspension of finely divided abrasive is applied to the tool tip. The tool is for cutting hard and brittle materials such as carbides, gem stones, glass, and ivory but in particular is for use by dentists. (20 claims, 24 illustr). See also USP 2,580,716.

J *Ceqr Pd.545*

Swiss P 343,555 **J. E. Tuscher, Ets Safety**
(Mar 21, 1957—conv date, France)

Automatic electro-spark method for machining a revolving body provided with teeth. Procédé d'usinage automatique par étincelles électriques d'une pièce de révolution présentant des dents

The machining of milling tools with sintered carbide teeth is usually carried out with diamond grinding wheels and presents certain difficulties, as well as being time-consuming and requiring special skill. Automatic spark machining, on the other hand, can be effected by a cathode as tool. The cathode is a revolving body with a profile corresponding to the profile to be machined and rotated about its axis at high speed; simultaneously, the workpiece as anode is rotated about a parallel axis in the same direction but at speeds alternating between slow, when a tooth passes before the cathode, and fast, when the space between the teeth passes before the cathode. The axial distance between the two electrodes is controlled as a function of the current before rotation. Rotation is stopped and the current cut off after each complete revolution. (12 claims, 6 illustr).

J *Ad Ceqm Unr.545*

FP 1,210,851 (Aug 22, 1958) **Caterpillar Tractor Co**

Method and apparatus for finishing a surface. Procédé et appareil de finissage d'une surface

The method is especially intended for finishing plated surfaces while in the plating bath. The usual procedure is to plate a surface and then to hone it to accurate dimensions as required, *eg* for the chromium plated injection cylinders of fuel pumps for IC-engines. A number of diamond hones is needed, each successively increasing the diameter of the hole by 0.0001 mm until the correct diameter is obtained. A piston is then selected which is produced to fit the exact dimensions of the cylinder; cylinder and piston have to remain

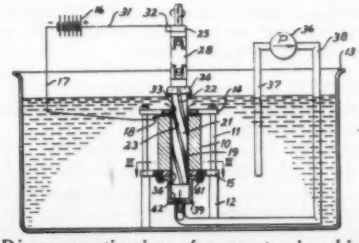


Fig 30. Diagrammatic view of apparatus in which plating anodes 22 are arranged in helical grooves 23 of hone 21. FP 1,210,851.

together constantly in order to protect the working of the pump from fluid. This procedure is extremely expensive. On the other hand it has not been possible up to now to finish a plated surface in its bath, because of the acids attacking the surfaces of the hones normally used. The new method makes use of a hone which is non-corrosive and of greater hardness than the plating material. The hone is of dielectric material with electric conductors incorporated in it to effect the plating and the honing operation simultaneously : this also has the advantage that interchangeable parts of a pre-determined degree of precision are obtained. The hone material is mainly aluminium oxide. Fig 30 shows diagrammatically an apparatus for plating and honing workpiece 10 by hone 21 with helical grooves 23 in which the plating anodes 22 are arranged. The hone is rotated and/or reciprocated in the workpiece. (16 claims, 5 illustr). *J* *Chm Pd.545*

PRODUCTION, GRADING & RECOVERY OF ABRASIVE PARTICLES

Testing the toughness of abrasive particles

J. Peklenik. *Industr Diam Rev* 1960 Vol 20 (238) pp 166-170, 172, 179 (Sep)

See *Industr Diam Abstr* 1960 Vol 17 p A198 (Aug). 8 illustr, 10 ref, 1 table. *A* *Bz Cveg*

Diamond compound experimental shop kit available

Diamond Dust Co Inc, 77 Searing Ave, Mineola, LI. *Carbide Engng* 1960 Vol 12 (8) p 31 (Aug)

This special kit has been prepared for the die shop and tool room. It contains Nos 1, 3, 15, 30 and 45 grades of diamond compound. *L* *Km*

USP 2,923,100 (Oct 11, 1957) **L. G. Simjian, Reflectone Electronics Inc**

Abrading device

A fluent abrasive mixture which can be rigidified and moved about the article is used for polishing irregular articles. The mixture may comprise small abrasive particles, *eg* silicon or boron carbide, aluminium oxide, diamond powder, and, when using a magnetic field for rigidification, magnetic abrasive particles, *eg* "Alnico",

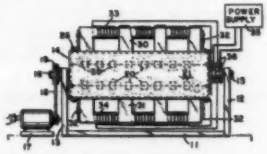


Fig 31. USP 2,923,100.

steel, barium ferrites, manganese-bismuth particles, or mixtures of magnetic and non-magnetic particles. To prevent coagulation and enhance finish a suitable liquid may be added, *eg* oil, water, turpentine, carbon tetrachloride, trichlorethylene. Fig 31 is a side elevational view of a typical device. 14 is the barrel rotated by electric motor 17. Articles 20 are arranged on flexible wires. 30, 31 are electromagnetic pole pieces on brackets 32. (12 claims, 6 illustr). Ref cited : 6 USP. *J* *Chm Rd.545*

REQUESTS FROM AMERICA

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Swiss P 343,835 **T. Horie**

(Oct 6, 1955—conv date, Japan)

Method of manufacturing abrasive articles. Procédé de fabrication de produits abrasifs

A mixture is prepared from a bonding liquid and abrasive particles. The mixture is emulsified in a foam in the presence of a gas and water to which a foaming agent has been added. The bond is then solidified. The bubbles in the mixture cause the distribution and retention of the abrasive particles between and in the bubbles of the mass and an article is obtained of a foam-like structure with a uniform distribution of the abrasive. The abrasive may be made adherent to paper, leather, fabric, *etc*, by using an adhesive. The bonding liquid may be a polyvinyl alcohol. As abrasive diamond powder, silicon carbide powder, or any other synthetic precious stone powder or other known abrasives may be used. (5 claims).

J *Pe Qc.545*

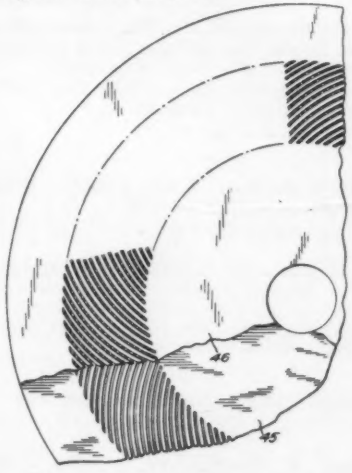
DAS 1,077,099 **G. F. Keeleric, Boart Products South Africa Ltd**

(Nov 25, 1953—conv date, USA)

Device for applying abrasive granules to a temporary carrier. Vorrichtung zum Aufbringen von Schleifkorn auf einen vorläufigen Träger

Difficulties are experienced when trying to cover an adhesive carrier with fine abrasive grains through an interposed pattern-producing screen in an electro-static field because of the many fine holes required. The

Fig 32. DAS 1,077,099.



problem has been solved by using two screens with intersecting patterns, the one nearer the carrier being provided with larger openings. Fig 32 shows the screens 45 and 46 superposed one above the other. (1 claim, 9 illustr). Ref cited : 3 GP ; 1 Swiss P ; 2 BP ; 4 USP. *J* *Ab Cs.545*

TOOL PRODUCTION

Aluminium oxide tools permit high speed machining

R. J. Dorr. *Metal Progr* 1960 Vol 77 (5) pp 106-107 (May)

D *Ceq Pdd*

Advantages obtained by 'pre-honing' the cutting edges of tools

H. J. Siekmann. *Machinery, Lond* 1960 Vol 97 (2490) pp 283-286 (Aug 3)

Research at GEC's Metallurgical Products Dept has indicated why conditioning the edges increases tool life and why factory honing gives best results. Hard materials are likely to be notch-sensitive and such notches on the tool edge may start cracking, chipping, and, ultimately, complete failure by fracture. Even diamonds exhibit notch sensitivity, and, starting from a fine scratch, it is possible to cleave them readily in certain planes. Microscopic examination reveals that when throw-away inserts are ground to a finish of 5-10 micro-in., many minute notches and points remain, but honing is shown to have eliminated these imperfections. Results of examination by electron microscope are discussed. 6 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A199 (Aug). *D* *Al Chh Uqe/Nh Uqe*

Fundamentals of the design of cutting edges of cutting tools

S. S. Petruchin. *Sowjet Buchneuerscheinungen, Vorankuendigungsdienst* 1960 (23) p 22 (Original in Russian)

Book, Mashgiz. 1960, 192 pp. Price DM 3.75.

The book discusses kinematics of the cutting process and relationships between the movements that appear during the shaping of the surfaces and the movements of the cutting edges of the tool.

[Not in library of Industrial Diamond Information Bureau]. *A* *Al Ceg.21.52*

The manufacture and use of milling cutters with sintered carbide inserts. Die Herstellung und der Einsatz von Fraesern mit eingeklebten Schneidplatten

W. Ehrlich. *Fertigungstechnik u Betr, Berl* 1960 Vol 10 (8) pp 459-461 (Aug) (In German)

7 illustr, 3 ref, 2 tables.

A *Alc Bkc Qc*

Planning for productivity . . . how a machine tool builder puts modern machines to work

T. W. Black. *Tool & Mfg Engr* 1960 Vol 45 (3) pp 79-86 (Sep)

Describes production methods at Warner & Swasey Company. Among machines discussed is a specially designed curvic coupling grinder with a cup type wheel for grinding curved slots and teeth in the locking devices for machine turrets. 13 illustr.

D *Az Chc Pr/Pr.13*

More chips no chatter . . . lathes have new look

J. W. Greve. *Tool & Mfg Engr* 1960 Vol 45 (3) pp 91-96 (Sep)

A survey of developments in lathe design and capabilities. 7 illustr. *D* *Ceqb Pr.132*

Machine Tool Exhibition, Hanover, 1960 — Machines for tool production and maintenance. Werkzeugmaschinen-Ausstellung, Hannover 1960 — Maschinen zur Fertigung und Instandhaltung von Werkzeugen

K. Schroedter. *Werkst u Betr* 1960 Vol 93 (9) pp 583-586 (Sep) (In German)

7 illustr. *A* *A Ceq Pr.27.322*

An application of the new N.E.L. hydrostatic transmission for machine tools

National Engineering Laboratory, East Kilbride. *Machinery, Lond* 1960 Vol 97 (2499) pp 789-791 (Oct 5)

3 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A224 (Sep). *D* *Pr Wp*

Grinding wheel strength

K. Greiner. *Tool Engr* 1960 Vol 45 (2) p 137 (Aug)

Reviews a report of investigations in which it was concluded that grinding wheels can be safely cemented to metal disks when the cementing agent is adapted to the requirements of the grinding wheels and grinding conditions, and recommends that cementing agents be selected from the class of synthetic highly polymerized plastics. The bonding between metal disk and wheel will be stronger than the wheel itself.

D *Pe Unl*

New carbide for high speed cutting; ingot structure emphasized in tool steels

W. E. Montgomery, E. W. Kalb. *Metal Progr* 1960 Vol 77 (5) pp 111-113 (May)

Factors to be considered when evaluating the properties of a cutting tool operating at high speed are listed. Because of its ability to retain hardness under extreme cutting conditions, Firth Sterling metallurgists regard some form of conventional carbide as offering the best basis for a finishing material capable of operating at high speed. Sufficient strength can be created only by binding carbide particles together with a metallic binder sintered in liquid phase. This fact led to the development of a new material called grade WF. Properties and tool characteristics are described. 1 illustr.

See also *Industr Diam Abstr* 1960 Vol 17 p A134 (May). *D* *Pdc Uq*

New tool steels for improved abrasion resistance and cutting of super-alloys

T. W. Gabriel. *Metal Progr* 1960 Vol 77 (5) p 114 (May). 1 illustr. *D* *Pdb.132*

Tool materials: drill for hardened steel

DoAll Co. *Metal Progr* 1960 Vol 78 (2) p 23-D (Aug)

In drilling hardened steel, Rockwell C-51 and harder, the area at the drill point becomes annealed as heavy pressure is applied: the drill then removes a softened chip. It can be re-sharpened or modified with an aluminium oxide wheel, since the tool is not made of carbide. High red-hardness prevents excessive damage to the point. The intense heat does round the point slightly, which actually helps in generating additional heat for annealing. The annealing effect is local and confined to a small area adjacent to the hole. This tool cannot be used on material which is naturally hard, but manganese steel and similar work hardening alloys can be drilled. 1 illustr. *D* *Bfd Cfb*

Increasing productivity with modern machine tools. Accroissement de la productivité avec des machines-outils modernes

R. B. Stoner. *Mach Mod* 1960 Vol 54 (618) pp 22-24 (Sep) (In French)

A *Pr.132.16*

New method of clamping sintered carbide inserts. Neuartige Klemmung fuer Hartmetallplaettchen

K. Ribstein. *Werkst u Betr* 1960 Vol 93 (8) p 478 (Aug) (In German)

1 illustr. *A* *Pdcb Qz*

Testing and comparing titanium carbide and ceramic cutting tools. Prove e confronti tra utensili in carburo di titanio e utensili ceramici

Anon. *Macchine* 1960 Vol 15 (9) pp 835, 837 (Sep) (In Italian)

1 illustr. *M* *Pdc*Pdd*

Tool wear

Anon. *Tooling* 1960 Vol 14 (10) p 31 (Oct)

Assesses the radio-isotope tool wear testing technique. Although in the USA the method has been reported to save 10% of machining cost on any job, and up to 50% on difficult jobs, it is pointed out that most irradiated tool tests have been on single point cutting tools : the application of the technique to punch and die performance would be of great value, it is considered.
D *A Cw Syb*

USP 2,926,651 (Sep 20, 1957) **H. E. Balsiger, Landis Tool Co**

Abrasive wheel forming and dressing apparatus

The apparatus is especially designed for truing the corners of a grinding wheel. As Fig 33 shows, there is provided : (*i*) a diamond truing tool 15 in any conventional arrangement to prepare the cylindrical part of the periphery of the wheel ; and (*ii*) a roller truing device on swing arm 20, turning about 21 : the roller 26 has corner truing flanges 27, and member 28 for limiting the approach to the wheel is shown in detail in Fig 34. An electrical control, including a timing device, prevents the operation of the diamond tool before withdrawal of the roller tool. The composition of the roller may include diamond or carbide impregnated surfaces. This type of roller rotates at a different speed from that of the wheel. If made of smooth or rough carbides or equivalent materials, the roller and the wheel rotate at the same peripheral speed and the wheel is trued by a crushing action. (9 claims, 4 illustr). Ref cited : 3 USP.
J *Ab Cg Psf.545*

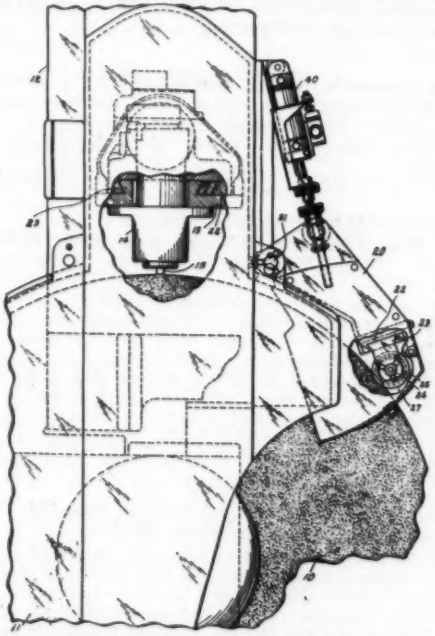
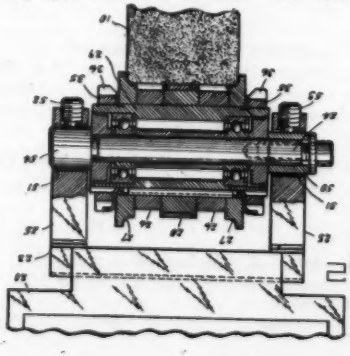


Fig 33 (above). Diamond truing tool 15 and a roller truing device on swing arm 20 are shown.
Fig 34 (below). A closer view of roller 26 with 28 limiting approach to the wheel. USP 2,926,651.



USP 2,927,405 (Nov 21, 1957) **F. Guzowski**

Contour grinder

The specification deals mainly with the mechanism for raising and lowering the work table, with the arrangement of the bearings, and with the mechanism and an oil cushioning device which keeps the table perfectly horizontal and easy to operate. Fig 35 shows the truing device with diamond 100 on screw 99 in holder plate 95, 98 adjustable in a slot on work table 20 where it is fixed by screwing device 97. For truing, the work table is raised by turning handle 45. (5 claims, 17 illustr). Ref cited : 5 USP ; 1 GP.
J *Chch Pr.545*

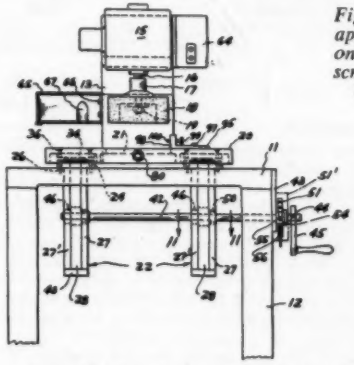


Fig 35. The truing apparatus is fixed on work table 20 by screwing device 97. USP 2,977,405.

Swiss P 343,834 **W. Osenberg, Bisterfeld & Stolting**
(Aug 12, 1954—conv date, Germany)

Face grinding wheel. Stirnschleifscheibe

It has been found that a wheel with several coaxially arranged grinding annuli, having a ratio of wall thickness to diameter in the range of 1 : 40 to 1 : 60, can be rotated at surprisingly high speeds up to 300 ft/sec and that sixteen times as much weight could be ground off a workpiece for each gramme of grinding element. The carrier disk of the wheel may be a synthetic resin bonded disk and the annuli may then be welded to it by application of heat and pressure. (4 claims, 7 illustr). *J* *Pe Urb.545*

FP 1,208,263 **W. Osenberg, Bisterfeld & Stolting**
(June 4 ; Sep 9, 1957—conv date, Germany)

Face grinding wheel. Meule travaillant par la face

The wheel belongs to the type with several concentrically arranged ceramic or resin bonded grinding elements. The new wheel is characterized by the use of thin elements embedded in a mass of resin foam or porous ceramic material. The narrow edge of the element ensures good abrasive action without requiring excessive grinding pressure which easily damages the elements as designed previously. (5 claims, 7 illustr).
J *Pez.545*

POWDER METALLURGY

Guide to specifying metal-powder parts

R. Talmage, H. L. Kee. *Prod Engng* 1960 Vol 31 (30) pp 56-59 (July 25)

5 illustr. *D* *Az Bfy.254*

Considerations on sintering, especially on the use of oxides in the manufacture of ceramic cutting tools. Considerazione sulla sinterizzazione, particolarmente riferite agli ossidi utilizzati nella fabbricazione delle ceramiche da taglio

M. Gion. *Metallurg Ital* 1960 Vol 52 (3) pp 120-127 (Mar) (In Italian)

22 illustr, 10 ref. *M* *Pdd Qc*

New developments in oxide carbide cutting materials in the DDR. Neuentwicklung von Oxyd-Karbid-Schneidwerkstoffen in der DDR

C. Agte. *Fertigungstechnik u Betr, Berl* 1960 Vol 10 (8) pp 464-467 (Aug) (In German)

7 illustr, 7 ref.

A *Pdc.132.322/Pdd.132.322*

BP 829,799 (Sep 18, 1957) **R. M. Gill, Carborundum Co Ltd**

Hard ceramic materials

A wear resistant body composed substantially wholly of alumina is produced by hot pressing, at a temperature and pressure of 1,400 to 1,700° C and 1,000 to 5,000 p.s.i., an extremely fine gamma alumina powder having a surface area of over 200 sq. m/gramme. Composition is 96% alumina powder and 4% natural impurities of a mean particle size of 0.01 microns. Lathe cutting tool tips were formed in a carbon mould as disks, ¼ in. diameter and ¼ in. thick : these were then shaped with a diamond grinding wheel to be mounted in a clamp type tool. (9 claims, 1 graph).

J *Al Bl Chc Nv.545/Al Bl Qc.545*

BP 829,948 **J. A. Bitterli. W. G. Hessler, H. A. Frommelt**

(June 2, 1955—conv date, USA)

Articles comprising a non-porous element mounted in a porous member and methods of forming such articles

Normally, hard bits of carbide, *etc.* are mounted in the recesses of their holders by clamping or by brazing and therefore must first be given smooth surfaces by grinding with diamond wheels. This operation increases the cost of using the average bit by as much as twice the price of the raw bit. The high costs of mounting a bit made it preferable to re-surface a worn bit to prolong its life, which in turn meant another expensive diamond grinding operation. Further disadvantages are certain stresses set up in the bit, fatigue failures, and chattering marks on the workpiece caused by vibrations. All these difficulties have been overcome by mounting the bit in a porous matrix of a sintered powdered metal infiltrated with a material or metallic substance promoting or producing growth. Iron powder of about 98% iron and particle size of 80-325 mesh has proved satisfactory as powdered metal when used with a copper base infiltrant of 90-97% copper and the balance iron. The bits may be carbides, ceramics, diamonds, garnets, et cetera. (14 claims, 33 illustr).

J *Alh Chc Nv.545/Alh Cr Psn.1456.545/Mf Nhb:Ld.1456.545*

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MISCELLANEOUS

Origin of the word 'Diamond'

Anon. *'Mindrill' Bits & Pieces* 1960 Vol 13 (5) p 6 (July)

D *F.28*

The histories of some famous diamonds

D. Dignam. *Diamant* 1960 Vol 4 (23) pp 17-23 (July) (In English, Flemish and French)

A foreword mentions some useful books on the subject and the article then describes briefly the histories of several famous diamonds, including the Cullinan and the Excelsior. (To be cont). *D* *F.28*

The foreign mineral trade of the U.S.S.R. in 1959

A. Gakner. *Miner Tr Notes* 1960 (Suppl No 60) 72 pp (Sep)

This report is based on an official Russian document *Statistical review of the USSR Foreign Trade in 1959*, and numerous other sources.

D *Bc.251.33*

West Germany's machine tool industry [:] A survey of the present position and of recent developments

A. J. Gibbs Smith. *Mach Lloyd* 1960 Vol 32 (18A) pp 24-26 (Sep 3) (In English, abstrs in French and German)

2 illustr, 2 tables. *D* *Pr.25.322*

Science and industry [:] Solid lubricants

US General Electric, Lincoln Hse, High Holborn, London WC 1. *Financial Times* 1960 (22162) p 11 (Aug 16)

A product has been developed which is claimed to have a much greater load-bearing capacity than normal solid lubricants. In tests done with a hard steel hemisphere sliding over a mild steel surface, a film of pure molybdenum disulphide withstood a ¼ kg load. When, however, silver sulphide was included in the lubricant, the load-bearing capacity increased to 5.3 kilogrammes. Even better results were obtained when the improved lubricant was used on relatively hard surfaces like chromium. *D* *Ceq Sk*

Frictional properties of molybdenum disulphide films containing inorganic sulphide additives

A. J. Haltner, C. S. Oliver (General Electric Research Lab). *Nature, Lond* 1960 Vol 188 (4747) pp 308-309 (Oct 22) ; *Engrs' Dig* 1960 Vol 21 (10) p 4 (Oct)

To be effective, solid lubricants should be highly durable. Recently it was observed that inorganic additives can greatly enhance durability of films formed by such lubricants which separate metal surfaces sliding against each other. Test procedures and observations are recorded. 1 table, 2 ref.

D *Cw Sk*

What they're offering in electrical controls

Anon. *Prod Engng* 1960 Vol 31 (40) pp 37-40 (Sep 26)

Surveys various machine tool controls exhibited at the 1960 Chicago Exposition. 16 illustr.

D *Pr Wp*

Electronics at the International Machine Tool Exhibition

S. Handel. *Mach Shop Mag* 1960 Vol 21 (8) pp 479-483 (Aug)

6 illustr. *D* *Pr We.27*

Present-day status of chip-formation research

H. Opitz. *Microtecnic* 1960 Vol 14 (4) pp 158-172 (Aug) (In English)

21 illustr, 51 ref. *D* *Ceq Pd.131*

International Machine Tool Exhibition

Anon. *Industr Diam Rev* 1960 Vol 20 (236) pp 126-130, 132-133 (July)

Products on show at Olympia are described under three headings: (*i*) diamond tools and products; (*ii*) cutting tools and materials in tungsten carbide; and (*iii*) machines and instruments. These have been reviewed in *Industrial Diamond Abstracts* in the appropriate sections, but this article presents a comprehensive and compact survey of diamond tools and products which gives an idea of the representation and importance of diamond as an industrial material at the exhibition. Seven firms showed diamond tools and powders but many others produced equipment suitable for use with diamond products. Items are reviewed under alphabetical lists of exhibitors. 11 illustr.

D *N.27/Pdc.27/Pr.27*

The 1960 Viscount Nuffield Paper of the Institution of Production Engineers [:] Machine tool development and national economy

S. Rawson. *Industr Diam Rev* 1960 Vol 20 (236) p 136 (July)

A summary of the paper is given.

D *Pr.132*

Testing the precision of electric instruments for the measurement of surface roughness

E. Bickel. *Microtecnic* 1960 Vol 14 (4) pp 149-157 (Aug) (In English)

7 illustr, 2 tables. *D* *Unf Vfd Wd.1341*

Recent developments in machine tool coolants

V. J. Haden. *The Prodn Engr* 1960 Vol 39 (9) pp 529-536 (Sep)

Traces growth of the use of coolants to the present day. 12 illustr. *D* *Pr Sj.132*

Gear testing apparatus for workshops. Werkstatt-Zahnradpruefgeraet

Carl Mahr, Esslingen aN. *Industriekurier* 1960 Vol 13 (157) p 605 (Oct 12) (In German)

1 illustr. *A* *Wgz*

Developments in drives and transmissions for machine tools

Anon. *Machinery, Lond* 1960 Vol 97 (2497) pp 651, 700 (Sep 21)

D *Pr Ps.132*

PUBLICATIONS RECEIVED

BOOK REVIEWS

The Diamond industry in 1958-1959. Het Diamantbedrijf in 1958-1959

A. Moyar. Vlaams Economisch Verbond, Schoenmarkt 31/VII, Antwerp. Oct, 1960, 120 pp, illustr, tables. Price B Fr 100.-- (In Flemish)

The latest book in this series is arranged similarly to the previous annual reviews, dealing with production, trade and cutting industry arranged under the various countries, and a section on industrial diamonds, with tables of the production of various countries, and world sales from 1954 to the first six months of 1960. Diamond tool developments in various countries are discussed. In Russia, there is a building project for five diamond tool factories which are expected to produce a wide variety of tools before 1965, using diamonds from the Siberian mines. A section deals with synthetic diamonds, including these made by the General Electric Co, and the Adamant Laboratory at Johannesburg; other firms that have manufactured diamonds and are still experimenting are also mentioned. The author considers that the synthetic product is more brittle than natural diamond and is therefore not a true substitute in all respects. It seems likely that in future markets a place will be found for both natural and synthetic diamonds. *L* *F.25.532*

Optical mineralogy

P. F. Kerr. McGraw-Hill Book Co Inc, New York, Toronto, London. 1959, 3rd ed, 442 pp, illustr, tables. Price £3 6s 0d

The use of the polarizing microscope in the study of transparent minerals is explained, many tables being used to aid identification, and the text being illustrated with diagrams and photographs. The optical properties of common minerals, including diamond, are given and optical principles discussed. The latest data and equipment are reviewed in this latest edition and the text has been revised to clarify further the discussion of polarized light in crystals. The text is intended primarily for thin-section study, but will be found useful in mineral fragment work. The opening chapter on mineral preparation for microscope study covers the use of diamond saws.

D *Bc Cc Wcmc.52/F Uk.52*

Sintered carbide tools for precision machining. Hartmetallwerkzeuge fuer die Feinbearbeitung

H. J. Burmester. DEVA Fachverlag in der Deutschen Verlags-Anstalt GmbH, Stuttgart. 1958, 56 pp, illustr. Price DM 4.60. (In German)

The book contains a thorough account of every aspect of the sintered carbide tool: different types of sintered carbide; use and manufacture of single-cutting chip forming tools for turning and precision turning, honing, and milling with one tooth; multi-cutting chip producing tools such as milling cutters, internal and external reaming tools, with regard to structure, manufacture, and tool geometry and results obtained with their use; and finally the use of sintered carbide tools for non-chip forming precision machining.

A *Ceqz Pdc.52*

TRADE LITERATURE

Collected catalogues

Pope Machinery Corp, 261 River St, Haverhill, Mass.

The company has designed and built 20,000 different precision spindles, a few of which are illustrated here. Spindles for grinding, boring, milling, drilling, and cutting are described. Anocut spindles are available for use with electrolytic grinders. Precision boring machines are also specified.

See also *Industr Diam Abstr* 1960 Vol 17 p A254 (Oct).

D *Cfdb Pr.57/Chcr Pr Psl.57/Psl.57*

Autoflow Rx diamond spherical generator Model 200, Mark II

Autoflow Engng Ltd, Lawford Rd, Rugby. 6 pp, 7½ × 10 in., illustr

The generator is said to be of exceptionally robust construction and to incorporate many special features. It is designed particularly for the spherical generation of ophthalmic lenses but is also suitable for some classes of scientific lenses where the precision of Autoflow hydraulic models is not essential. Special features include a thin-wall diamond milling tool of special bonding which is claimed to give much freer cutting and yet to maintain form longer than hitherto. A signal light indicates that grinding is finished against a positive stop. Simple adjustment compensates for diamond tool wear. Correct grinding pressure, perhaps the most important feature of diamond generating, can be achieved in a few seconds by patented adjustable work pressure. Another patented feature is the dioptre setting clock. The off-set grinding head swivels on the radius of the diamond impregnated tool so that only one setting changes the curvature to be generated. Other features are described and technical data are given. The '200' machine is available in units of 1, 2, or 4 spindles.

D *Bm Chct Nv Pr Tfb/Chct Nr Pr*

Autoflow Auto Cyl automatic toric smoother and polisher

Autoflow Engng Ltd, Lawford Rd, Rugby. 2 p, 7¾ × 10 in., illustr

This automatic toric smoother and polisher is of entirely novel design, the new movement and automatic flow facilitating high lens output to a controlled time cycle and permitting one operator to attend a bank of machines with ease. The machine is only 23 in. wide and can thus be closely positioned to the bench. Each machine has a re-set type electric timer switch which automatically switches it off at the end of a pre-set cycle. Pressure control and button adaptors are other features. Maintenance is said to be exceptionally easy.

D *Az Chm Prs.57*

M825 Tri-Matic edger

British American Optical Co Ltd, 39 Hatton Gdn, London EC 1. 8 pp, 8½ × 11 in., illustr

Bevel, rimless, and hand edging are possible on the one machine which features two important engineering principles: since it is cut on the top of the stone and not on the face, the groove is curved and corresponds naturally to curved lens; and, secondly, since the stone is set at a 45° angle the lens and stone contact is at one point only. Among features described is the simply operated truing device which automatically maintains size.

The AO M825W Dual-Matic edger is also mentioned, differing from the M285 Tri-Matic in that the stone profile makes it strictly a bevel edger. One grooving of the double grooved grinding stone can be reserved for glass and the other for plastic lenses.

D *Chcs Pr.57*

DTR diamond wheels, catalogue No MR60

Diamond Tool Research Co Inc, 380 Second Ave, New York 10. 18 pp, 8½ × 11 in., illustr.

The company specializes in diamond products only and claims to take advantage of all important advances in industrial diamond products, being for example, the sole manufacturers of 'pressure-tested' abrasive grits and powders. Care is taken to ensure exact duplication of products and a diamond reclamation service is offered. Advice is given on storing and mounting DTR wheels, and on the use of coolants, speeds, and feeds. An explanation of the wheel marking system is provided as are particulars of how to order wheels. Specifications are given. *D* *Nv.57*

Diamond dies. Filière en diamant

Ets Joseph Vianney, 19 Blvd de l'Industrie, Trévoux (Ain), France. 14 pp, 7½ × 11¾ in., illustr. (In French, English and German)

An outline of the history of the firm is given. In 1876 Joseph Vianney and other craftsmen first introduced diamond dies. Information includes data on die construction. The diamond die has six main parts; the five operations required in its manufacture are flattening, drilling, counterdrilling, polishing, setting, and the qualities required of a good die are that it must be a pure diamond with suitable profile and perfect polish. Vianney have developed a flanging process using an alloy which strengthens resistance and makes possible the use of small diamonds. Diamond dies are supplied Mounted or unmounted in sizes from 0.008 to 3.00 millemetres.

A tungsten carbide die has four parts and the firm manufactures its own carbide cores to ensure satisfaction. 'Tungsteel' dies are supplied bored and polished, bored and rough ground, and bored and rough, in sizes from 0.10 to 50 millimetres. Specifications are given. *A* *Nk Qc.57*

Gem quality diamond dies . . . in all sizes for all metals

British Diamond Wire Die Co Ltd, Parkstone, Dorset. 12 pp, 6¼ × 9¼ in., illustr

It is claimed that the same fine quality stones which are fashioned into gems are used by the company for making dies, and that each stone has to justify itself in terms of economical wire production. Selection of diamonds is the most important feature of diamond die manufacture as this determines subsequent life of the die; profile, polish, and reinforcement also contribute to wire drawing performance. Diagrams show profile nomenclature and mounting, and different stages of die manufacture are photographed. The catalogue concludes with advice on diamond die maintenance.

See also *Industr Diam Abstr* 1960 Vol 17 p A250 (Oct).

D *Nk Qc.57/Nk.138.57*

Metallographic materials — Price List No GMP/760

Shandon Scientific Co Ltd, 6 Cromwell Place, London SW 7. 8 pp, 8½ × 11 in.

The list has been issued to help metallurgists choose the most suitable material for specimen preparation; special emphasis is laid on modern techniques such as wet grinding and diamond polishing. Diamond's particle hardness and characteristic shape make it ideal for rough and final polishing. Cutting life is much greater than with ordinary abrasives so that less material is needed to prepare the specimens. Accurate sizing of diamond particles enable much better polishing control because the best sequence for finishing a specimen can be selected. Other advantages are mentioned. The use of a paste carrier ensures that abrasive concentration is duplicated from batch to batch of the mixture. Hyprez diamond dust compound, specially produced for metallographic specimen preparation, is available in eleven grades. It is supplied ready for use in sealed dust-proof plastic cartridges, which form the barrels of the applicator gun; mixing is unnecessary. Specifications are given.

D *Bfa Chm Km.57*

The art of Blanchard surface grinding

Blanchard Machine Co, 64 State St, Cambridge 39, Mass. 48 pp, 5½ × 7¾ in., illustr

A booklet intended to help users of the company's range of grinding machines and wheels. Surface grinding of the usual ferrous, many non-ferrous materials, and such minerals as quartz, agate, and sapphire can be done. Types of wheel most commonly used are Cylinder, Segment and Sectored Wheels and

the abrasive grain is either silicon carbide or aluminium oxide. The Blanchard method of marking is explained and wheel recommendations are made with examples of selection for various jobs. Stress is laid on the importance of proper handling of machines. In the grinding of some non-metallic pieces, different holding methods are necessary. Diamond wheels must be used for grinding quartz, natural corundum, hard ceramic, and synthetic sapphire. Dressing instructions are given.
D *Chcm Nv Pr.57/Chcm Pr.57*

CDP Cemented Diamond Particles

Koebel Diamond Tool Co, 9456 Grinnell Ave, Detroit 13, Mich. 6 pp, 6½ × 9 in., illustr

A new material is composed of uniformly distributed diamond particles securely held in position by means of a recently developed Koebelite powdered metal matrix. The special matrix wears in such a way that fresh edges of the diamond particles are continually exposed. The material practically eliminates voids caused on the cutting edge of the wheel where unsupported grains are knocked out by a heavy cut with a single point tool. The diamond particles used are carefully selected and graded. The CDP process is said to make available the entire diamond for use, and also to eliminate the necessity of re-setting to a new point. A wide variety of grinding operations can be performed with CDP tools. *A* *Km Nv Urc.57*

Black Diamond Deluxe Drill Grinder

Black Diamond Saw & Machine Works Inc, Natick, Mass; Edward Blake Co Inc, 570 Pleasant St, Watertown 72, Mass. 2 pp, 8½ × 11 in., illustr

Described as a complete, self-contained drill grinding department, the deluxe model is designed for maximum production in the sharpening of drills with a minimum of operator fatigue. Wheel life is said to be greatly extended by utilizing the entire wheel face and by the Mist Spray Coolant System. Two diamond dressers, mounted at 15° angle for self-sharpening, dress both the face and the periphery of the wheel. Periphery is dressed at a 5° angle, assuring a sharp wheel edge for web thinning The standard model Black Diamond drill grinder for drills up to ½ in. and the Worcester drill grinder for drills up to 2½ in. are also described.

See also *Industr Diam Abstr* 1960 Vol 17 p A253 (Oct). *D* *Alb Chc Pr:Nj Psf.57*

Geological laboratory and field equipment

Cutrock Engg Co Ltd, 35 Ballards Lane, London N 3. 30 pp, 5¼ × 8 in., illustr

The catalogue is in several parts. The rock sectioning equipment includes the Mark II Mottacuttar rock cutting and grinding machine which uses diamond impregnated cutting wheels. Another machine with a diamond wheel is the bench mounted semi-portable Minnicutta. Rock core cutting machines include a core driller with diamond impregnated drills for producing cores from hard specimens. The rock clamping unit has 360° radial movement and will hold either hand specimens or drilling cores. Drill diameters are to fit customers' requirements. The BCM 200 refractory brick and rock cutting machine can use either 12, 14, or 16 in. diameter diamond wheels, while a lapping machine for the off-hand grinding of sections and mounted specimens employs a 4 in. and 6 in. diamond cup wheel. Other items include laboratory and field equipment, machine units, and diamond impregnated cutting and grinding wheels, metal or resinoid bonded; diamond abrasive dust can also be supplied.
D *Bn Ceg Nv.57/Bn Chc Nv.57/Bn Cfb Nqg.57*

Precision thread and form grinders

Sheffield Corp, Dayton, Ohio. 12 pp, 8½ × 11 in., illustr

Models 101 and 103, claimed to be two of the most versatile external grinders available, perform plunge and 'pass-over' grinding of 8-40 pitch Class 3 threads or precision worms with 'Crushtrue' wheel dressing; 'pass-over' grinding of up to 80 pitch precision threads using either diamond trued, multi-ribbed, or single point wheels; and plunge grinding of circular forms of intricate profile with 'Crushtrue' wheels. Advantages of the 'Crushtrue' multi-rib wheel include the possibility of plunge grinding threads or worms in one-and-a-half turns of the work and to the width of the wheel face. These grinders also offer the time-saving features claimed for 'pass-over' grinding of long single or multiple start threads. A multi-ribbed diamond dresser gives the required accuracy of thread form, angle, and lead for precision thread gauge or lead screw work, while a single-rib diamond dressed wheel 'pass-over' grinds Acme and other special thread forms.

Standard and optional accessories are listed and various applications of these models are illustrated. Wheels, feeds, and coolants are recommended for use with the 'Crushtrue' dressing process. Specifications are given.
D *Chcb Pr:Nj Psf.57/Chcp Pr:Nj Psf.57*

IDR REPRINT SERVICE

The following reprints are now available from Industrial Diamond Information Bureau, 2 Charterhouse Street, London EC 1, at a charge of 1s each, post free:

C 99—Diamond. Part 1, by S. Tolansky (*Contemporary Physics* 1959).
C 100—Diamond. Part 2, by S. Tolansky (*Contemporary Physics* 1960).
I 254—Test blocks for indentation hardness testing, by J. G. Wood (*IDR* 1959).
I 255—The practical realization of the HV and HR scales, by R. S. Marriner (*IDR* 1959).
I 256—A film for recording the reactions in the diamond wheel structure, by K. E. Schwartz (*IDR* 1959).
I 257—The grinding technique and its importance for the proper use of carbides in the wood-working industry, by T. Englesson (*IDR* 1959).
I 258—Some growth characteristics of synthetic diamonds: a distinction between natural and synthetic diamond, by S. Tolansky and I. Sunagawa (*IDR* 1960).
I 259—Interferometric studies on synthetic diamonds, by S. Tolansky and I. Sunagawa (*IDR* 1960).
I 260—The use of a new kind of precision micro-sieve for grain-size analysis, by O. Lauer (*IDR* 1960).
I 261—Improvements in diamond drilling and sawing: the effects of soft soap as a wetting agent and softener, by G. B. Dauncey (*IDR* 1960).

PATENT LISTS

BRITISH

The Official Journal (Patents) 1960 (3737) (Sep 28)

854,541 CLEVELAND TWIST DRILL CO. Electrolytic sharpening, shaping and finishing of electrically conductive materials.

The Official Journal (Patents) 1960 (3740) (Oct 19)

856,340 SPARCATRON LTD. Apparatus for working electrically conductive materials by electric erosion.

856,047 RUDORFF, D. W. A. F. Diamond tools.

The Official Journal (Patents) 1960 (3741) (Oct 26)

856,662 BISTERFELD, E. [trading as BISTERFELD & STOLTING]. Grinding wheels.

856,983 ROLLS-ROYCE LTD. Formation of holes by spark erosion.

UNITED STATES

Official Gazette 1960 Vol 758 (1-4) (Sep)

2,951,475 P. G. LEO, HYRESGASTERNAS SPARKASSE-OCH BYGGNADFORENINGARS RIKSFORBUND UPA, J. F. LUNDQUIST. Sawing of stone blocks.

2,952,098 H. S. GIVEN, CORNING GLASS WORKS. Severing apparatus.

2,952,101 L. A. CARLSON, WOOD CONVERSION CO. Drill sharpener and method.

2,952,102 V. E. MATULAITIS, ELOX CORP. Single point tool grinder.

2,952,103 W. OSENBERG, BISTERFELD & STOLTING. Grinding wheels with abrasive elements of rectangular shape.

2,952,529 H. N. STONE, BAY STATE ABRASIVE PRODUCTS CO. Resinoid bonded abrasive wheels.

2,952,948 P. F. BARKER, GLEASON WORKS. Gear grinding machine.

2,952,949 P. MAKER, BRYANT CHUCKING GRINDER CO. Grinding machine.

2,952,951 H. A. SIMPSON. Abrasive or like materials and articles.

2,952,952 R. C. STANHOPE, MICROMATIC HONE CORP. Abrasive element.

2,953,354 E. B. WILLIAMS jun, E. B. WILLIAMS III, J. W. WILLIAMS, D. B. WILLIAMS. Drill bit.

2,954,211 R. U. PENROD. Method and means for drilling with changeable bits.

SOUTH AFRICAN

Official Journal 1960 Vol 13 (34-38) (Aug-Sep)

60/1039 J. A. HJALSTEIN, SANDVIKENS JERNVERKS AB. Drill bit.

60/1158 J. TAYLOR, L. K. REEVE, ASSOC ELECTRICAL IND LTD. Cutting tools.

60/1180 J. DIONISOTTI. Rock drilling tool.

SWISS

Patentliste 1960 (15) (suppl); (16-17)

348,311 M. NARUSE. Method of manufacturing spiral and hypoid bevel wheels.

348,312 H. SCHICHT, W. FERD KLINGELNBERG SOEHNE. Correction of the contact face of gear wheels by lapping.

343,591 L. GAUTHIER, ATELIERS DE CONSTRUCTION LAVALETTE. Device for machining a metallic workpiece by anodic dissolution.

348,597 E. WILDHABER, GLEASON WORKS. Machine for producing the teeth of gear wheels.

343,625 L. R. DAVIDSON. Method of mechanically finishing the surface of workpieces and machine for carrying out this method.

348,757 L. BENES, VYSKUMNY USTAV PRE MECHANIZACIU A AUTOMATIZACIU. Arrangement for the automatic control of electro-erosive devices.

348,758 L. BENES, B. BOHUS, J. KUNC, VYSSKUMNY USTAV PRE MECHANIZACIU A AUTOMATIZACIU. Electro-erosive wire saw.

348,857 O. F. BAUER, E. D. DAMMERT, GLEASON WORKS. Machine for causing the rotation of two gear wheels in mesh with each other in order to carry out finishing operations on these gear wheels.

348,889 E. FUCHS, WAGNER & ENGLERT GmbH. Grinding wheel and method of its manufacture.

FRENCH

Bulletin Officiel 1960 Vol 1 (36-40) (Sep-Oct)

1,241,529 J. -B. BALDESSIN. Machine for sawing plates and panels, in particular of marble.

1,241,165 W. TIRASPOLSKY. Core drill with rolling cutters.

1,241,838 HAMMOND MACHINERY BUILDERS INC. Work holding device, in particular for electrolytic grinding machines.

1,242,121 SPIEGELGLASWERKE GERMANIA AG. Method of manufacturing grinding wheels, having grains embedded in a bond, for polishing glass.

1,242,294 L. A. HANSEN, R. E. PEMRICK, J. W. SPRAGUE, NORTON CO. Applied abrasive.

1,241,807 M. G. ANADONE. Machine for sawing stone and similar materials.

1,242,542 W. S. PRAEG, NATIONAL BROACH AND MACHINE CO. Machine for grinding gear wheels.

1,242,738 L. O. CARLSEN, GLEASON WORKS. Machine for cutting gear wheels by the generating method.

1,242,336 SOCIETE NOUVELLE DE METALLISATION. Manufacture of metallic objects and in particular electrodes for machines working by electro-erosion and the resultant products.

1,242,787 R. G. ELLIS, K. R. BLAKE, MICROMATIC HONE CORP. Method and tool for machining spherical surfaces.

1,243,279 H. P. BOVENHERK, GENERAL ELECTRIC CO. Method and device for manufacturing diamond crystals.

1,243,338 G. L. HAYWOOD, NORTON CO. Abrasive product.

1,243,377 L. COES jun, CIE DES MEULES NORTON. Grinding wheel and its method of manufacture.

1,242,942 M. S. T. PRICE, UNITED KINGDOM ATOMIC ENERGY AUTHORITY. Production of artificial graphite.

1,243,527 SOCIETE D'ETUDE ET DE REALISATION D'OUTILLAGE DIAMANTE SEROD. Method of agglomerating diamond powder.

73,697/ 1,165,357 INSTITUT DR ING REINHARD STRAUMANN AG. Manufacture of pivots and spindles, in particular for watches.

1,090,565 J. C. ANDERSEN, CARBORUNDUM CO. Manufacture of dense bodies of silicon carbide.

1,090,929 D. R. DANIEL, NATIONAL BROACH & MACHINE CO. Method for manufacturing a gear-like honing tool for the finishing of gear wheels.

1,090,990 A. LAMESCH, J. JANSEN, B. KNOSPE, CIE DE SAINT-GOBAIN. Lower grinding body of a device for the simultaneous grinding of both sides of a ribbon of glass.

1,090,991 E. BRUCKNER, E. HENKEL, GEBR NETZSCH MASCHINENFABRIK. Machine for grinding circular annular faces on cups, plates or the like.

GERMAN

Patentblatt 1960 Vol 80 (38-41) (Sep-Oct)

Applications Open to Public Inspection

1,089,662 G. MOELLI, NAXOS-UNION SCHLEIFMITTEL- UND SCHLEIFMASCHINEN-FABRIK. Device for cooling a rotary, porous grinding wheel.

1,089,741 A. A. BALLMAN, A. J. CAPORASO, R. A. LAUDISE, WESTERN ELECTRIC CO INC. Method of growing corundum crystals.

1,039,995 H. SCHLADITZ. Microtome.

1,090,131 PILKINGTON BROTHERS LTD. Grinding device for grinding a horizontally travelling ribbon of glass.

1,090,132 HOWARD WALL LTD. Device for the intermittent feed and application of a polishing mass onto polishing disks.

1,090,439 F. WERNER, CONTINENTAL ELEKTRO-INDUSTRIE AG ASKANIA-WERKE. Manufacture of precision graduations, in particular of circular divisions for optical angle measuring instruments and the like.

1,090,537 U. HARTJE. Device for the faceting of precious or ornamental stones or the like.

1,090,539 G. KEMPER, KEMPER-KONTAKT GERT KEMPER. Wheel to be used as contact wheel or as grinding, polishing or fettling disk.

CORRIGENDA

See *Industr Diam Abstr* 1960 Vol 17 p A45 (Feb) **DAS 1,059,378**: For ' Simens-Schuckertwerke AG ' read ' Siemens-Schuckertwerke AG.'
See *Industr Diam Abstr* 1960 Vol 17 p A135 (May) **Swiss P 340,727**: For ' C. A. Redfern ' read ' C. A. Redfarn.'

ABSTRACT NOTIONS

Trade literature for you . . .

Trade literature reviewed in *Industrial Diamond Abstracts* is *not* available on loan. Readers wishing to obtain copies should contact the manufacturer whose address is shown at the beginning of the review.

. . . and for us

In order that readers may be kept informed of developments in the industrial diamond and allied industries, manufacturers are requested to send review copies of their trade literature to: Industrial Diamond Information Bureau, 2 Charterhouse Street, London EC 1.

Loan Service requests

The Loan Service operated by the Information Bureau is very widely used by firms and individuals in the United Kingdom, so much so that it is not unusual for several requests to be received for the same article. If users of the Loan Service will ensure that borrowed periodicals are returned within the specified 15 days, it will reduce the delay for those on the waiting list.

A short cut . . .

Our librarian receives many requests from America for the originals of articles that have appeared in the American trade papers. A delay is thus caused as the librarian has to contact the American journal concerned in order to pass on the request. Two trips across the Atlantic could be avoided if American readers would apply direct to the journal in which they are interested.

. . . and a close shave

The Industrial Diamond Trade Names Index is now in preparation. Those firms who have not yet returned their forms are reminded that there is not much time left in which to do so: a delay in returning the form could result in the firm's name being missed from the Index.

Addresses

Readers are reminded that it is in their interest to keep the Information Bureau informed of any changes of address.

GENERAL NOTES

The Industrial Diamond Information Bureau is included in the Diamond Research Organization of Industrial Distributors (Sales) Ltd (incorporated in the Union of South Africa), together with the Diamond Research Laboratory in Johannesburg.

Abstracts

The Bureau prepares abstracts of current scientific and technical literature, including patents, on industrial diamonds and associated subjects. These are published monthly in *Industrial Diamond Abstracts*, which is supplied free to those concerned with the use of diamonds for industrial purposes, and to specialist libraries. The publishers do not claim any copyright in respect of abstracts in this journal. No specific acknowledgement is made to other abstract journals, and no objection will be made to other abstract journals using the contents.

The list of journals (latest issue, September 1955) from which *Industrial Diamond Abstracts* is compiled will be supplied on request.

Library

The Bureau has a Reference Library which seeks to cover world literature on the application and production of diamond tools. It is kept up to date by a careful examination of new publications announced in abstract and technical journals, and covers, in addition to English, German, French and Russian books. The library specializes in technical and scientific pamphlets.

Patent Abstracts

Patent lists are prepared from official patent journals of the major industrial countries, and patent abstracts in general from the printed patent specifications. Printed copies of British patent specifications accepted may be obtained from the Patent Office, Southampton Buildings, London WC 2, at 3s 6d each. Numbers given under British applications for patents are for reference in all correspondence up to acceptance of the complete specification.

The following abbreviations are used :—BP for British Patent, USP for United States Patent, DAS for German Patent Application, DBP for German Patent (GP for German Patents issued prior to 1950), FP for French Patent, Canad P for Canadian Patent, and RP for Russian Patent.

Supply of Literature

1. **Loan Service :** much of the literature abstracted in this journal is available in its original form, and can be borrowed for a period of fourteen days (in Great Britain only). When applying for a loan, please quote the title of the article, the name of the author, and the number of the page on which it appeared. *Do not quote* the coding at the end of an abstract as this is for internal reference only.

2. **Reprints :** copies of certain selected articles on industrial applications of diamond are available and can be supplied on request at a charge of 1s each, post free. New reprints are announced from time to time in this journal, and a classified list of reprints, dated September 1958, is available free on request.

Technical Information

The Bureau offers the resources of its considerable literature holdings to those seeking specific information on diamond tool and similar applications. Problems requiring fuller technical assistance can be referred to the Diamond Research Laboratory, Johannesburg.

Inquiries in connexion with these services should be made to Industrial Diamond Information Bureau, Industrial Distributors (Sales) Ltd, 2 Charterhouse Street, London EC 1.

INDUSTRIAL DIAMOND INFORMATION BUREAU

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LIST OF PUBLICATIONS, DECEMBER, 1960

***INDUSTRIAL DIAMOND ABSTRACTS:** issued monthly, from 1944 onwards, about 20 pp, 7⅜ x 9¼ in. Surveys technical, scientific, and patent literature.

***LIST OF PERIODICALS—BIBLIOGRAPHY OF INDUSTRIAL DIAMOND APPLICATIONS:** Alphabetical, 8 pp, 7⅜ x 9¼ in., Sep 1955.

***LIST OF PERIODICALS IN THE INDUSTRIAL DIAMOND INFORMATION BUREAU LIBRARY AT MAY 31, 1958:** Alphabetical, 8 pp, 7⅜ x 9¼ in. A list of periodicals available for loan from the Industrial Diamond Information Bureau Library. This does not replace *List of Periodicals* (above), which is a list of periodicals abstracted in *Industrial Diamond Abstracts*, many of which are not held by the Library.

***IDR REPRINT SERVICE :** Classified, authors' index, subject index of groups, 12 pp, 7⅜ x 9¼ in., Sep 1958. (Reprints 1s each, post free).

***THE DIAMOND RESEARCH LABORATORY:** 16 pp, illustr, 11 x 9 in. Rev ed, 1956.

SELECTED BIBLIOGRAPHIES:

* **Truing of grinding wheels** (from 1910 to 1951). 39 pp, 7⅜ x 9¼ in. 3rd rev ed, Feb 1952.

* **Diamond as cutting tool for metals and non-metallic materials.** 24 pp, 7⅜ x 9¼ in. 2nd rev ed, Nov 1950. Name index, 1951.

Hardness and hardness testing (from 1937 to 1955). 118 pp, name index, subject index, 7⅜ x 9¼ in. 1955-56. Price 5s 6d.

DIAMOND TOOL PATENTS (Patent Monographs)

IA: Machining metals and non-metallic substances, by P. Grodzinski, W. Jacobsohn. 2nd rev ed, 55 pp, 7⅜ x 9¼ in. Apr 1949. Price 10s.

II, IIs: Diamond abrasive wheels, by P. Grodzinski. 74 pp, 4 tables, name index, 7⅜ x 9¼ in. Aug 1948/49. Price 13s 6d.

III, IIIs: Truing of grinding wheels, by W. Jacobsohn. 133 pp, 82 illustr, name index, 7⅜ x 9¼ in. Dec 1948/49. Price £1.

IV: Polishing of gem diamonds, by W. Jacobsohn. 40 pp, 83 illustr, 1 table, name index, 7⅜ x 9¼ in. December, 1950. Price 12s 6d.

IA to IIIs available as compilation in Spirollo binding, price £2 9s.

THE PRINCIPLES AND DESIGN OF A NUCLEAR RADIATION COUNTER WHICH USES A DIAMOND AS ITS DETECTOR, by W. F. Cotty. 18 pp, illustr, 7⅜ x 9¼ in. Oct 1956. Price 2s 6d.

DATA SHEETS FOR THE DIAMOND TOOL DESIGNER AND MAKER—Definition and designation of angles: Comparison of names for tool angles: Plane of chip flow: Clearance and rake angles: Minimum clearance for diamond boring tools: Economic layout of tool tips: Height position of turning tools: Accepted standards. 1945, reprinted Oct 1956. Price 5s

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* *Publication free of charge.*

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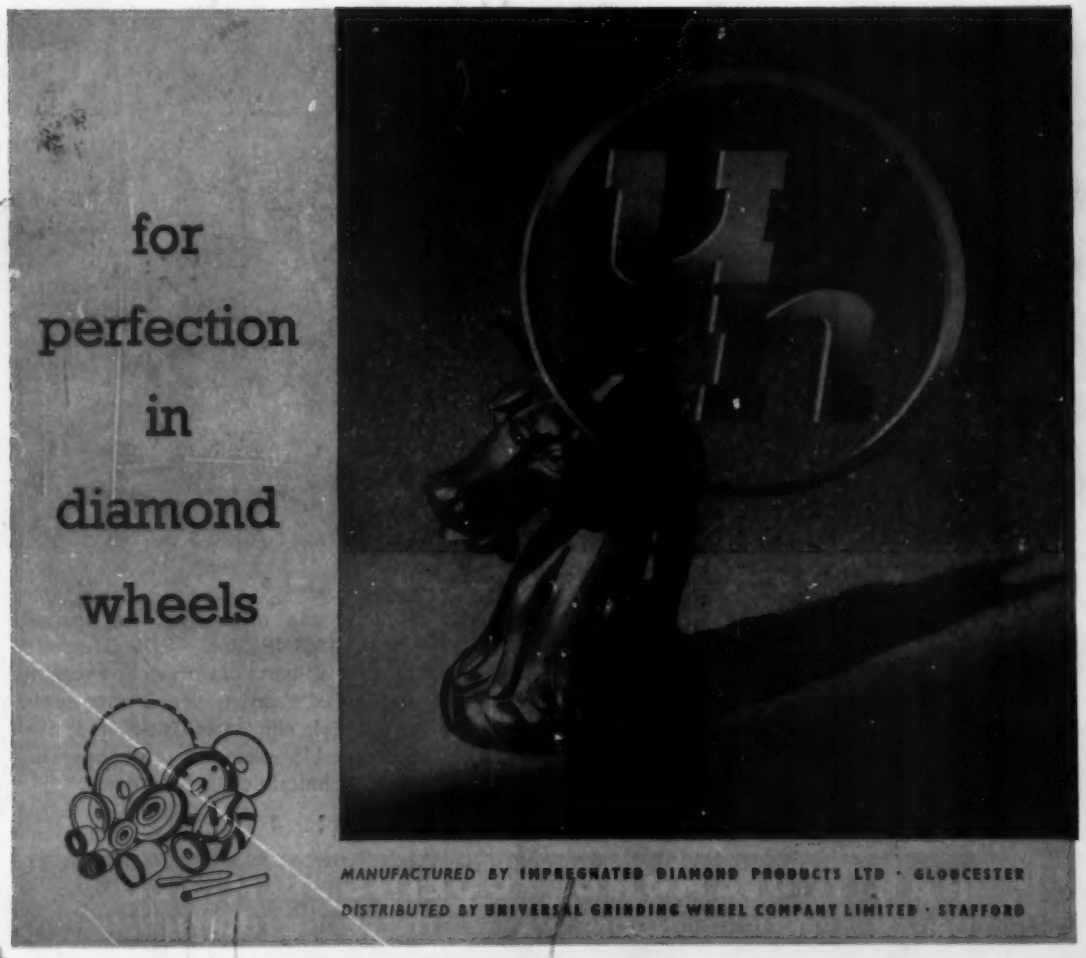
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